MAY 1954

APPLIED HYDRAULICS

THE MAGAZINE OF FLUID POWER TRANSMISSION

INCLUDING AIR CONTROLS AND AIR CIRCUIT DESIGN; ELECTRICAL CONTROLS

Hydraulic Transmissions 63

Bonded Seals 69

Central Hydraulic System Design 72

High Pressure Control on Mobile Equipment 80

Air Devices Assure Accuracy 84

Air Powered Strapping Machine 92

Listed on page 2 you'll find 12 articles and 7 regular departments which feature application and design ideas for fluid power equipment.

In thousands of plants . . .

WHEN FLUID LINE TROUBLES ARISE . . . WHEN HOOK-UPS ARE BEING PLANNED OR ALTERED—

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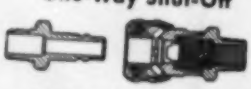

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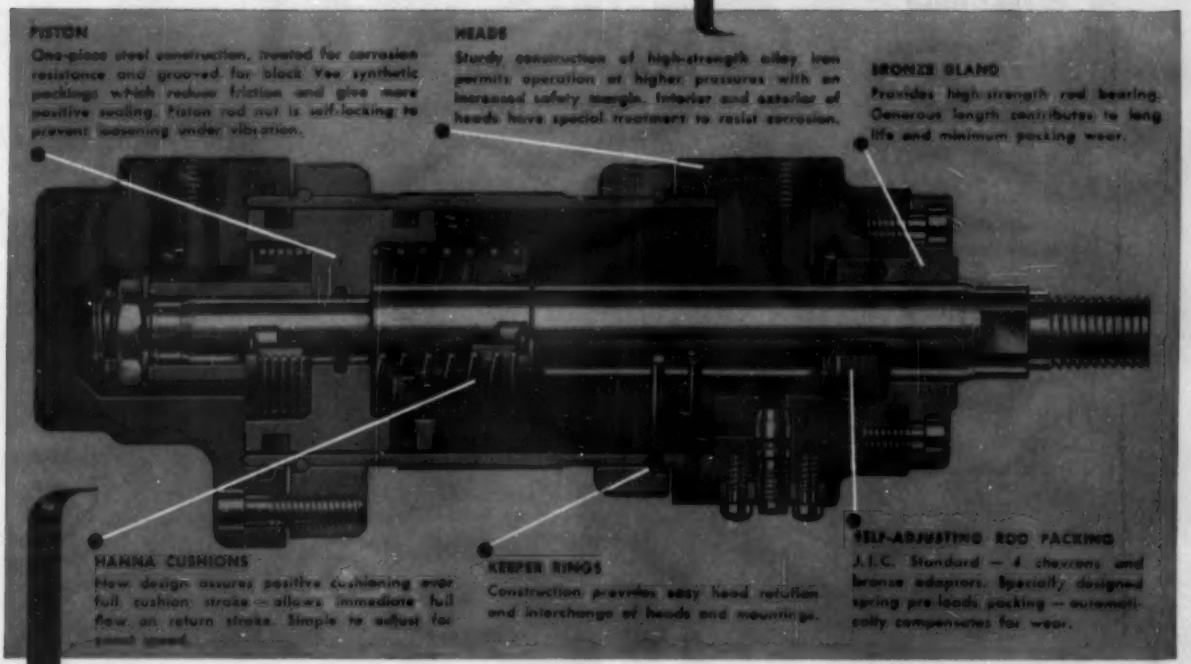
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Vol. 7, No. 5

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PNEUMATICS - HYDRAULICS - ELECTRICAL CONTROLS

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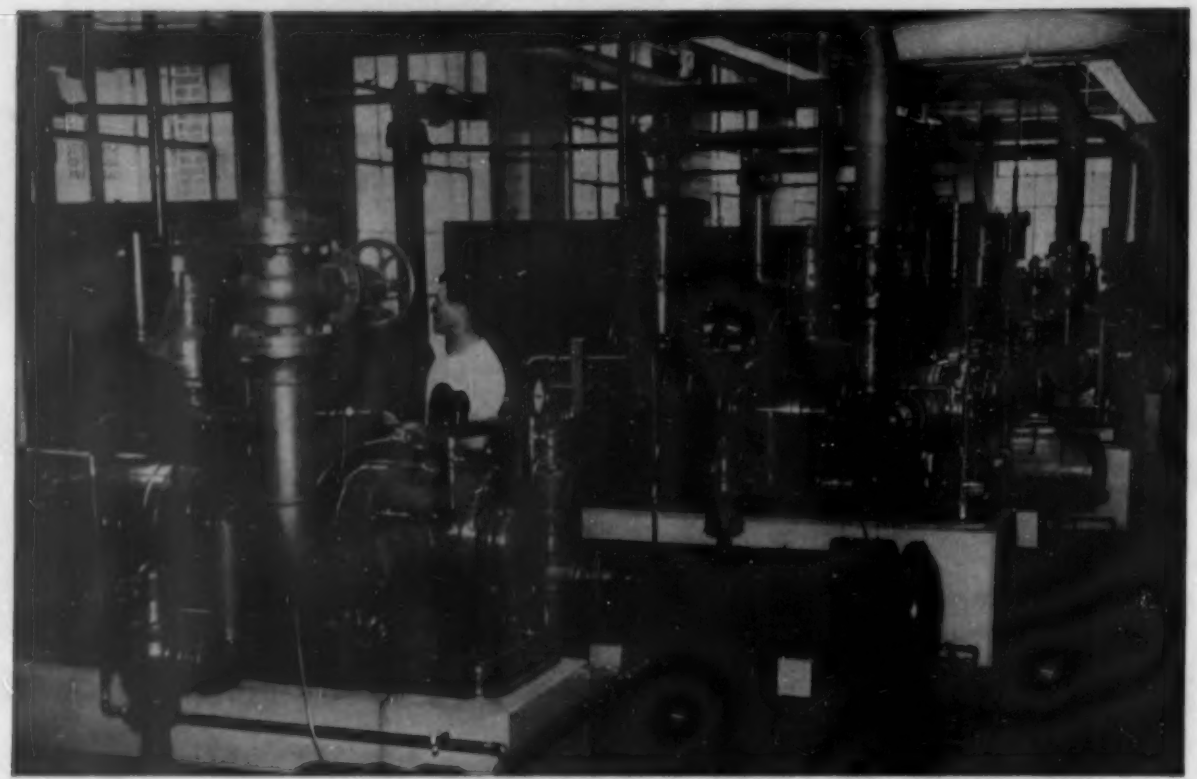

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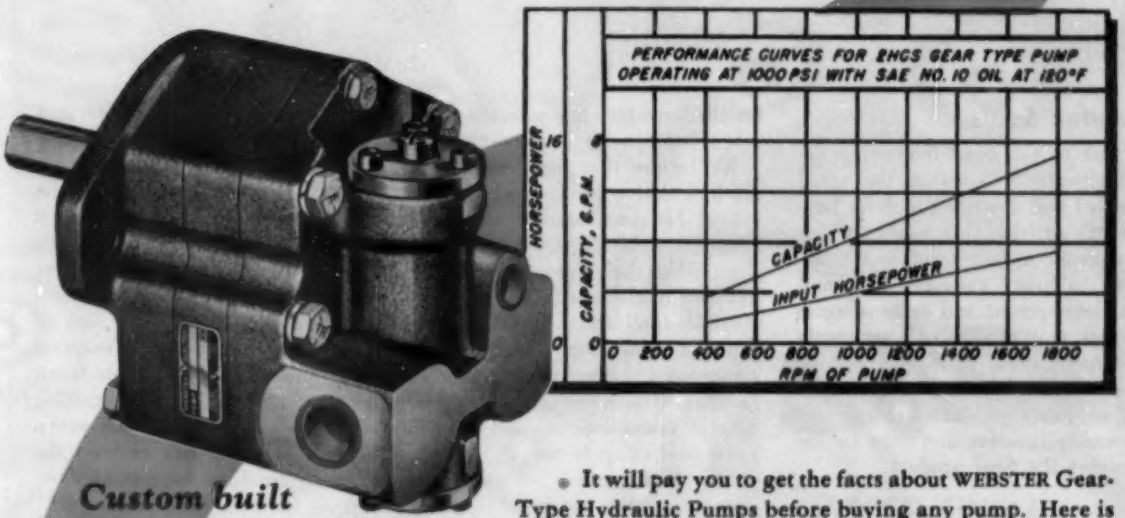

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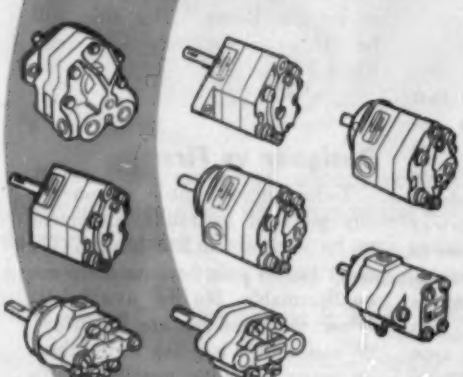

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APPLIED HYDRAULICS

Fluid Power Lines

Bonded Seals

One of the most interesting developments in seals is the small bonded seal described in John Lankester's article. This washer which fits under a bolt head is the answer to many assembly problems. Its development and success again proves that many small seemingly inconsequential parts can be improved. And because they are used in so many products, their value is multiplied over and over by improving the final product.

What's in a Name?

What would you name your company if its principal product were toilet seats? This isn't a pressing problem in our life. However, it was to someone. We thought their selection of a name shows more than average ingenuity in applying the English language.

During a recent trip to New York, Marty Lipton, of The Airoyal Company, suggested we call on The Mundane Products Company. He said they had an interesting hydraulic circuit on a plastic molding press. It occurred to us that the company name was unusual, but if Mr. Munn and Mr. Dane wanted to form a business with that name it was okay with us.

Anyway, you guessed it. When we arrived at the company, there wasn't any Mr. Munn or Mr. Dane. But their product is toilet seats—a more mundane product would be hard to find.

Variable Speed

This month's lead article, by C. G. Ellis, describes a hydraulic drive installation which fills several speed-torque-horsepower requirements.

We believe that there are many machine design projects which will benefit by consideration of a hydraulic system for power transmission. While the rotary transmission has been in use over 50 years, many possible applications remain to be explored. Engineers, machine designers and management should be familiar with the advantages of hydraulic transmissions, and should know how to apply them.

Mr. Ellis' article offers many suggestions for successful application of variable speed drives.

A New Approach

Any survey of industrial hydraulic installations will show that the oldest power systems use a central station having large gas over water accumulators. Over the years many changes have been made in control mechanisms and power pumps. Very little has been done to change the accumulator arrangement. In this issue, Bill Lytle offers a method of central hydraulic system layout which uses piston type accumulators to add to the capacity of a conventional system. Use of the piston type accumulators offers several other advantages which are pointed out by Mr. Lytle.

"Automate with Eight"

To create the automatic plant requires devices which will automatically move material from the receiving room, through all production processes and out onto the shipping dock. To describe automatic handling of materials and parts in and out of machines, Mr. D. S. Harder, vice president in charge of manufacturing of the Ford Motor Company has for some time used the word automation. It's a nice word. Easy to spell and far easier to repeat than automatization. It's also nice because it's one of those words which has a roaming definition. Of course, automation isn't new. We've been describing automatic machinery for six years. *FLOW* magazine has covered the material handling aspects of automation for over nine years.

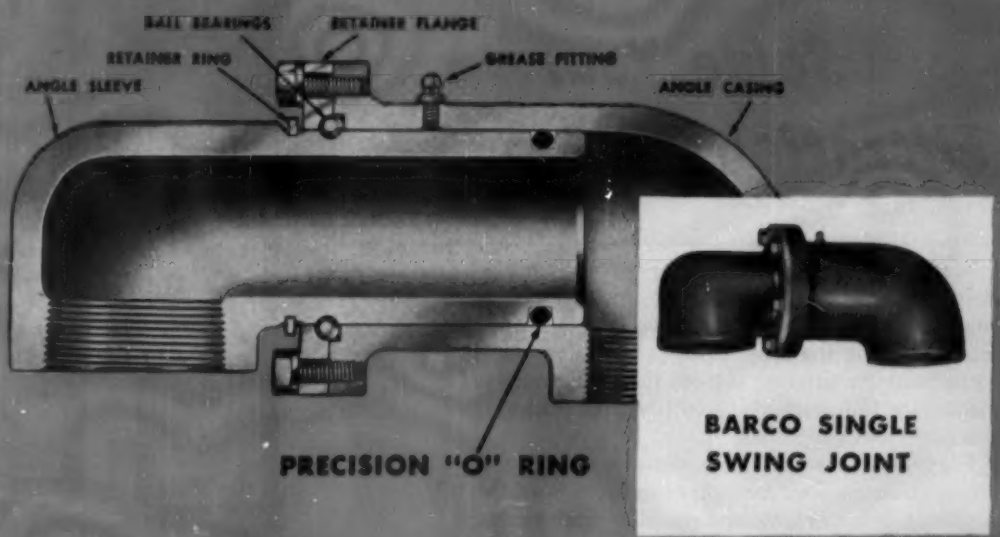
We expect that some bright prolific wife of an industrial engineer will soon create a sequel to "Cheaper by the Dozen." Her title will be "How to Automate with only Eight."

Designer vs Fire

Today there is little reason for any piece of hydraulic equipment to be a potential fire hazard. We don't say so only because there are nonflammable fluids available. While the nonflams are important, no one, today, is going to use them on every hydraulic installation. To avoid fires, there is much that can be done by careful circuit design and machine layout.

The article "How Proper Hydraulic Circuit Design Can Reduce Fire Hazard" describes a circuit change which is simple to make. It is a change which would have been unnecessary had the designer of the original circuit given more thought to possible fire hazard. Since hindsight is always wiser, perhaps the article will give you an idea before the fire extinguisher is needed.

Swing to PRECISION "O" RINGS for economy and rugged service!



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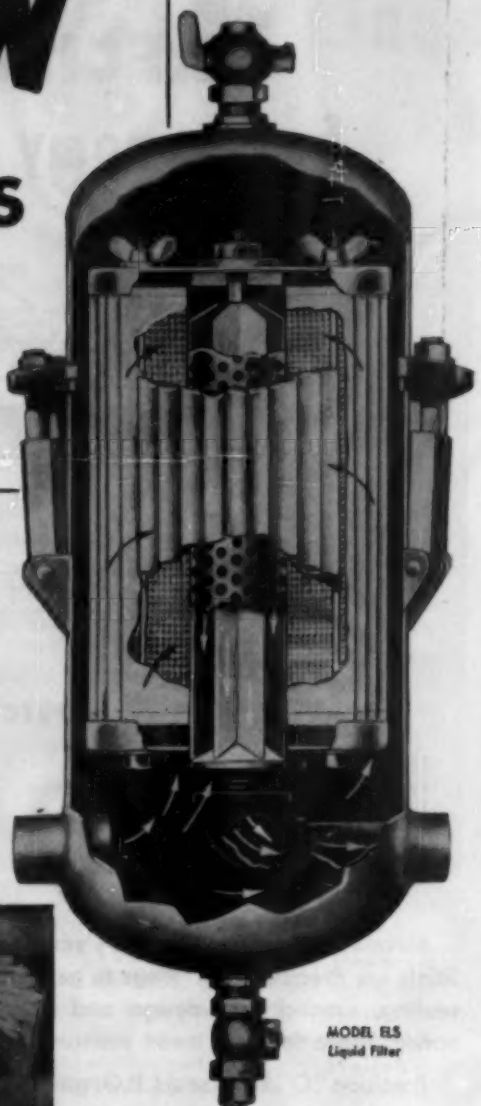

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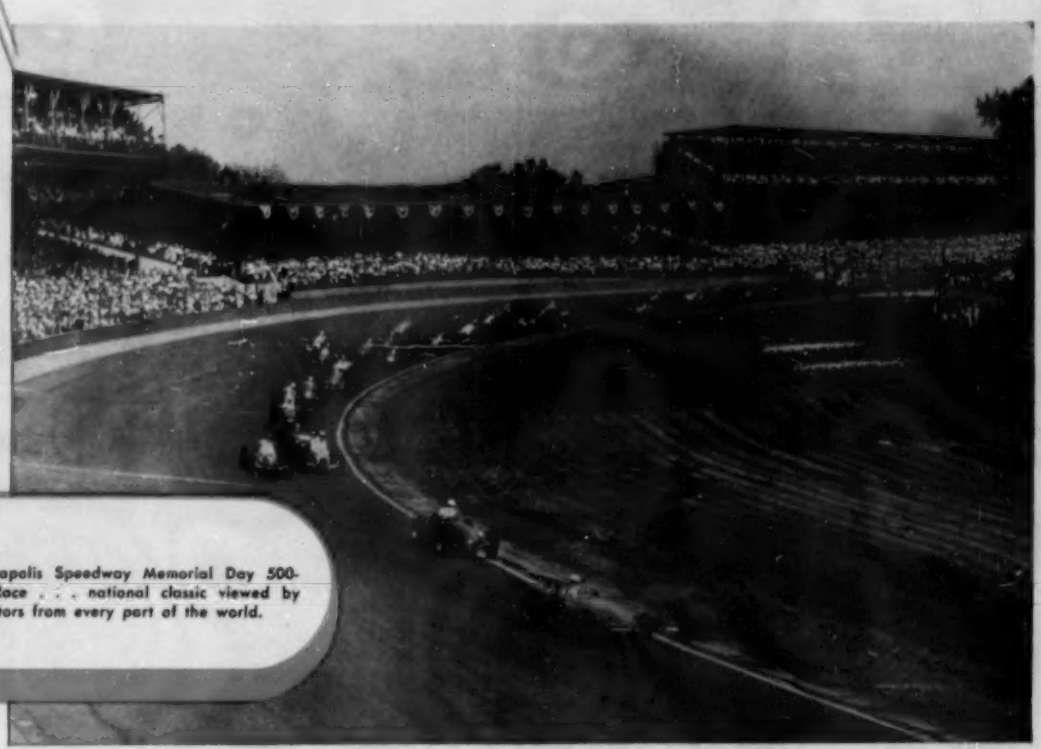

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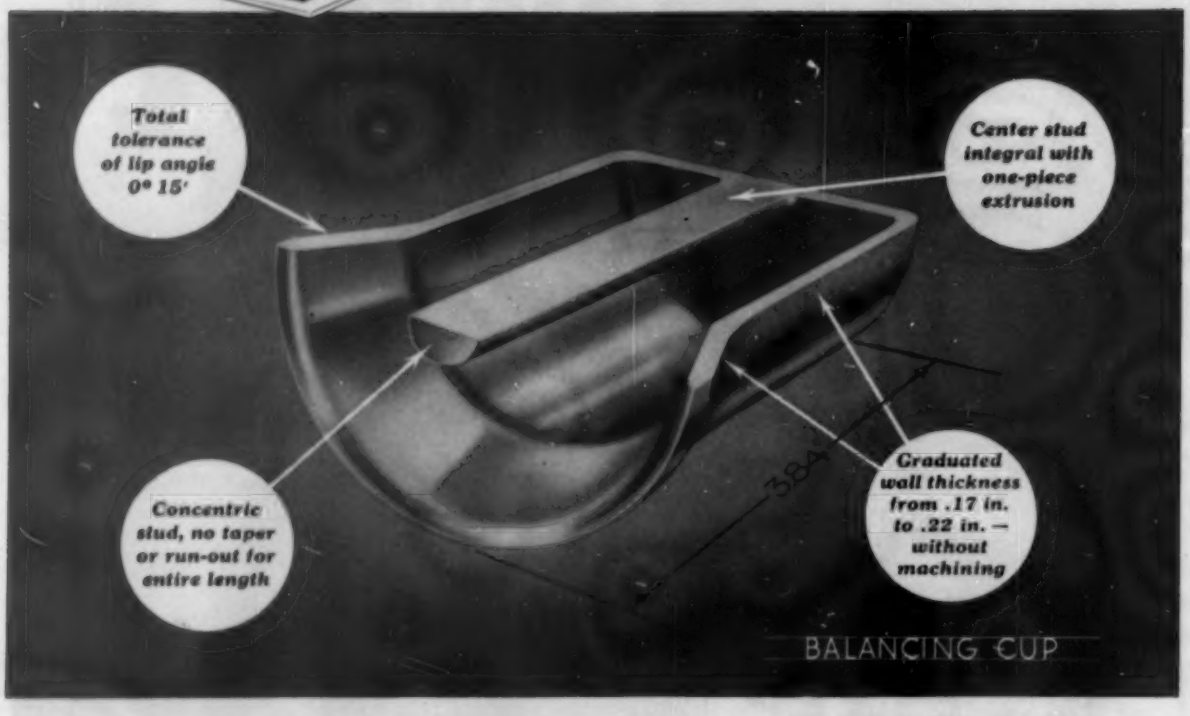
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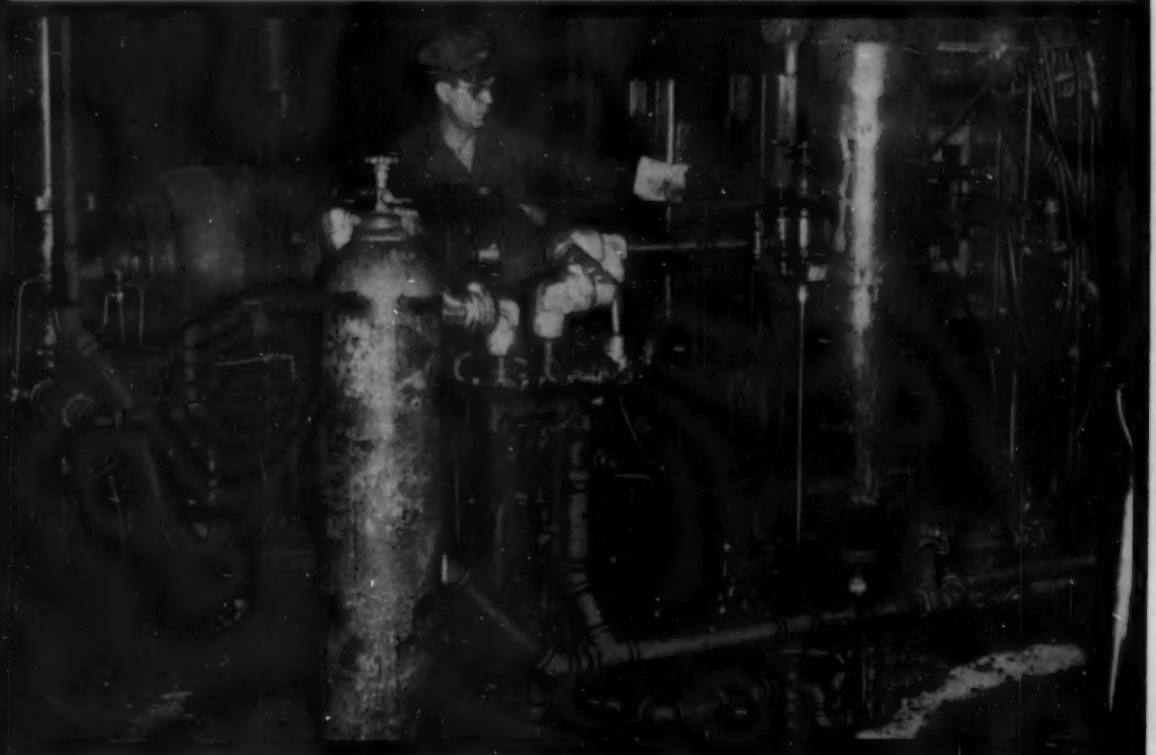
How Mall Tool Puts Safety in Hydraulic Lines

FIRE-RESISTANT PYDRAUL F-9



How to make die-casting machines safer for operators, more efficient in production? Mall Tool, manufacturer of more than 1000 separate portable items—many of them die-cast—does it this way:

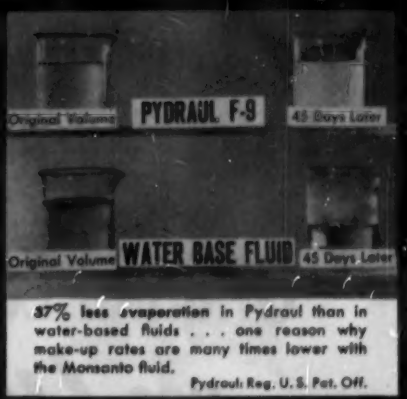
One by one, they are converting their machines to Pydraul F-9. Under test, this remarkable hydraulic fluid will not sustain flame even when sprayed into a 6000° F. oxyacetylene jet. If a hose should rupture, Pydraul would spray harmlessly into pots of liquid metal or even into furnace flames.

No waste, no corrosion. Mall finds oil make-up per machine averages 60% less with Pydraul than with ordinary fluid. Pydraul has a chemical base—not water or petroleum—and is noncorrosive to metal parts. It can be re-used again and again with no loss of lubricating characteristics.

Soon all Mall hydraulic machines will have Pydraul in their lines.

Pydraul's recent price reduction makes it more than ever the most economical fire-resistant fluid in actual use.

Write for this engineering report, "Pydraul F-9."
Organic Chemicals Division, MONSANTO CHEMICAL COMPANY, Box 478, St. Louis, Missouri.



37% less evaporation in Pydraul than in water-based fluids . . . one reason why make-up rates are many times lower with the Monsanto fluid.

Pydraul Reg. U. S. Pat. Off.

MONSANTO
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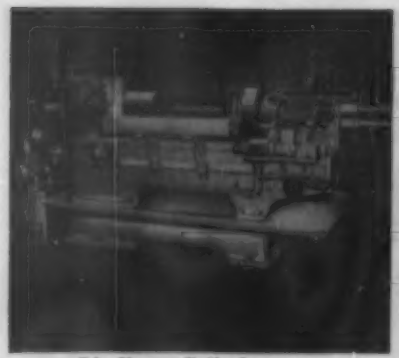
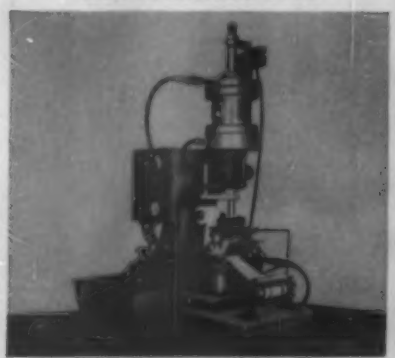


Lindberg Cylinders are used on Machine Tools

. . . and Clamping Machines

. . . and Material Lifting Equipment

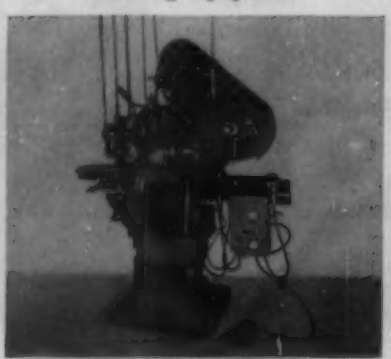


. . . and Marking Machines

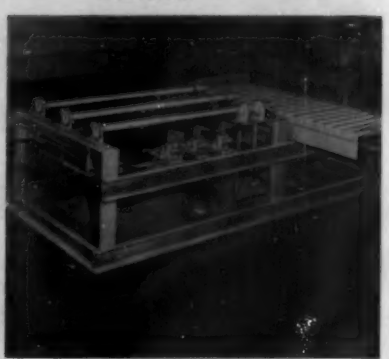
. . . and Steel Mill Material Handling Equipment

. . . and Heat Treating Furnaces

. . . and Hydraulic Presses



. . . and Cutting Machines



. . . and Automation Lines

Original Equipment Manufacturers use *LINDBERG* Cylinders

(Lindberg offers a complete line of Air and Hydraulic Cylinders. Ask for Bulletin No. 800)

LINDBERG AIR . . HYDRAULIC CYLINDERS

Lindberg Air and Hydraulic Division, Lindberg Engineering Company, 225 North Laflin Street, Chicago 7, Illinois

SKINNER INTRODUCES

A NEW SMALLER FOUR-WAY SOLENOID VALVE

for operation of a double-acting cylinder or two single-acting cylinders

176 VARIATIONS
OF CAPACITIES, METERING & TYPES

The V9 is offered in 3 basic types: normally closed, normally open, or combination — normally open and normally closed.

Pressures range from 50 to 150 p.s.i. With orifices from 1/64" to 1/8" dia., V9 models have an exceptionally wide range of port locations and metering flow adjustments for Speed Control.

This series meets Skinner's highest traditions of quality. V9 construction is packless, frictionless; there are no troublesome sliding seals or close fits. Bodies are die-cast zinc; internal parts are made of stainless steel. Steel coil housing has zinc chromate finish. Coils are moisture-resistant, varnish-impregnated; molded "waterproof" coils available on request.

LEAKPROOF
Bubble-tight shut-off at all ports

FAST OPERATING
Up to 6 hundred cycles per minute

DIRECT ACTING
Positive spring-loaded operation — *NO* sliding seals, will operate in any position

DEPENDABLE
Millions of cycles on most applications — without maintenance

V5-2 SHUT-OFF 2-way 0-1000 p.s.i.

V10 HYDRAULIC 3-way 0-1000 p.s.i.

M3 PILOT OPERATED 2- and 3-way 5-150 p.s.i.

X5 EXPLOSION PROOF (V5 type) 2- and 3-way 0-1000 p.s.i.

V5-3 QUICK EXHAUST 3-way 0-150 p.s.i.

V2 SHUT-OFF 2-way 0-200 p.s.i.

V50 AIRCRAFT (Aluminum Body) 2-way 0-3000 p.s.i.

GENERAL SPECIFICATIONS

MEDIA.....Air, hydraulic oils, and other common media
PIPE SIZE.....All pipe connections ¼" NPT
ELECTRICAL OUTLET.....½" NPT Conduit
DUTY CYCLE.....Continuous
VOLTAGE.....All common AC and DC voltages
POWER CONSUMPTION.....Per Coil — 10 watts
Both Coils — 20 watts max.
TEMPERATURE..... Minus 65°F. to Plus 150°F.

Modern production equipment and methods assure immediate delivery on stock valves, and highest quality standards. Valves are guaranteed for 1 year against defects in materials or workmanship.

For detailed specifications write for Bulletin No. 532

SKINNER ELECTRIC VALVES

SKINNER SOLENOID VALVES

SKINNER ELECTRIC VALVE DIV., The Skinner Chuck Company, 105 Edgewood Ave., New Britain, Connecticut

GROWING HORIZONS FOR FLUID POWER

NEWS • ACTIVITIES • PLANS

Summer Refresher Courses

A two week refresher course in "Basic Oil Hydraulics" will be offered for the first time this summer by Illinois Institute of Technology in Chicago. Initiated at the request of numerous industries using oil hydraulics, the course is designed for maintenance technicians and others already working in the hydraulics field.

The course will be held from June 7 through June 18, 1954, on the IIT campus. Illinois Tech offers the most complete educational program in the United States in the rapidly growing field of oil hydraulics. You can get further information about the new summer course from the Department of Mechanics, Illinois Institute of Technology, 3300 S. Federal Street, Chicago 16, Ill.

Also of interest to men in the hydraulic field is the special summer program to review developments in Machine Tool Technology which will be given at the Massachusetts Institute of Technology from June 15 through June 25. A similar two week program in Numerical Control of Machine Tools will be presented from August 23 to September 3 in the M.I.T. Servomechanisms Laboratory.

New Product Developments

Demands for hydraulic components which will withstand higher temperatures and pressures are being met by the efforts of many engineering groups throughout the country. At the recent annual stockholders meeting of the Aeroquip Corporation, B. A. Main, Jr., vice president in charge of engineering, pointed to the progress his group is making along these lines: "With the 'sound barrier' having been overcome, the industry faces a new hurdle, which might be called a 'heat barrier'. The friction of rapid flight through the atmosphere raises temperatures inside aircraft and missiles. Our new products are better than the old ones by at least 100 degrees Fahrenheit, but future aircraft demands will require even more heat resistance than this. We soon expect to have hose lines and couplings to withstand temperatures up to 450 degrees and 500 degrees Fahrenheit.

"High pressure hydraulic hose lines have always been a tricky problem, and the industry in general has made relatively little advance in this field for several years. We have hit upon a new wrapped construction of hose lines that will withstand higher pressures. This item will broaden the usage of our high pressure hose lines."

Plastics for Fluid Power Use

With plastics finding their way into every industry we've been keeping alert for uses in the fluid power field. Plastic materials have proved valuable for packings. As packing materials, plastics are solving friction and temperature problems. At the present time, cost of some plastic materials prohibits use on applications where their unique properties are not required.

The most interesting use of plastics for a hydraulic component which has come to our attention is a Fiberglas-Epon resin air bottle for use on a 3000 psi aircraft pneumatic system. Having a burst strength of 7,000 psi, the bottle weighs only 16 pounds empty as compared to 25 pounds for a steel unit. Developed by Bendix Aviation, Teterboro, N. J. and Apex Electric Mfg. Co., Cleveland, Ohio, the air bottle is for use on a jet engine starter system. Holding 8 pounds of air at 3000 psi, the bottle has a 13 inch diameter with ¾ inch thick walls.

Acceptance of Standards

It has only been a little more than a year since the Joint Industry Conference standards on packings were released. The standards cover dimensional data on depths and thicknesses. During the short period of a year, these standards have gained wide acceptance with the user and packing manufacturer. One packing manufacturer reports that they soon expect that 75 percent of their cup packing business will be according to standards.

Undoubtedly the standards have gained prompt acceptance from the user because they have helped him select packings, reduce his inventories and to obtain quicker deliveries. The success of this standardization adds emphasis to the need for completing work on standardization of hydraulic and pneumatic components.

RACINE

ALL COMPONENTS FOR ANY HYDRAULIC CIRCUIT

"They work better together"

WRITE FOR NEW CATALOG AND
NAME OF NEAREST FIELD OFFICE.
Complete Engineering Service
Available without charge. Address:

RACINE HYDRAULICS & MACHINERY, INC.
2074 ALBERT ST., RACINE, WISCONSIN, U.S.A.

RACINE
RACINE
RACINE
SEQUENCE • HOLDING • RELIEF • PRESSURE COMPENSATED
PRESSURE REGULATING • PRESSURE COMPENSATING
FLOW REGULATING • FLOW DIVIDING • VARIABLE DISPLACEMENT

RACINE HYDRAULICS & MACHINERY, INC.
RACINE, WISCONSIN

It has to be good

When it can't be readily serviced—that's another WATERMAN FLOW REGULATOR Story.

Yale & Towne, one of the leading manufacturers of material handling equipment use WATERMAN FLOW REGULATORS as standard equipment on all their fork trucks. This is not unusual, since WATERMAN supplies the majority of flow regulators used for lift trucks, but the position of the regulator demonstrates the confidence Yale & Towne have placed in WATERMAN equipment. The flow regulator is installed inside the lift cylinder. This means that the flow regulator is not readily accessible for servicing. No flow regulators or any other hydraulic equipment would be installed in such a position if it did not give years of trouble free service.

A 6,000 lb. Yale Gas Fork-Lift truck in operation.

Wherever constant flow or fluid is required regardless of pressure or back pressure fluctuations, WATERMAN FLOW REGULATORS are the answer. More and more manufacturers incorporating hydraulic equipment in their products are finding the WATERMAN FLOW REGULATORS simplify circuits, reduce weight, space and cost while providing automatic flow regulation. Available in a range of sizes and a variety of models.

Write for our illustrated brochure A.

Waterman

ENGINEERING COMPANY

725 CUSTER AVENUE • EVANSTON, ILLINOIS

SPEED KING

SOLENOID PILOT OPERATED CONTROL VALVE

by VALVAIR

DESIGNED AND BUILT TO J. I. C. STANDARDS

- **A Hefty Assist to Automation**
- **Fully Enclosed**
- **Integral Junction Box**

The Valvair line broadens again — with Speed King's exclusive features. All parts are totally enclosed. The Speed King will operate submerged in water or buried in sand. Simplicity! — only two moving parts. Molded coil — no wear or shorting out. 20,000,000-cycle life and more. Speed King is industry's most rugged and compact valve.

Other features: for pressures from 35 to 200 p.s.i. pneumatics, hydraulics, vacuum; complete line—2-way, 3-way, 4-way and 4-way-5-port (2-pressure) models; foot or sub-base (manifold) mounting; pipe sizes —¼", ⅜", ½", ¾", and 1".

Ask For Bulletin "A-5"

Representation in: BALTIMORE • BIRMINGHAM • BOSTON BROOKLYN • BUFFALO • CHARLESTON, W. VA. • CHICAGO CLEVELAND • CRANFORD, N. J. • DAYTON • DENVER DETROIT • EUREKA, CALIF. • GLENSIDE, PA. • HOUSTON KANSAS CITY, MO. • LOGANSPORT, IND. • LOUISVILLE MILWAUKEE • MINNEAPOLIS • PASADENA • PITTSBURGH PORTLAND • ST. LOUIS • SAVANNAH • SEATTLE MONTREAL • TORONTO • VANCOUVER

VALVAIR CORPORATION *Affiliate: Sinclair-Collins Valve Company*
951 BEARDSLEY AVE., AKRON 11, OHIO

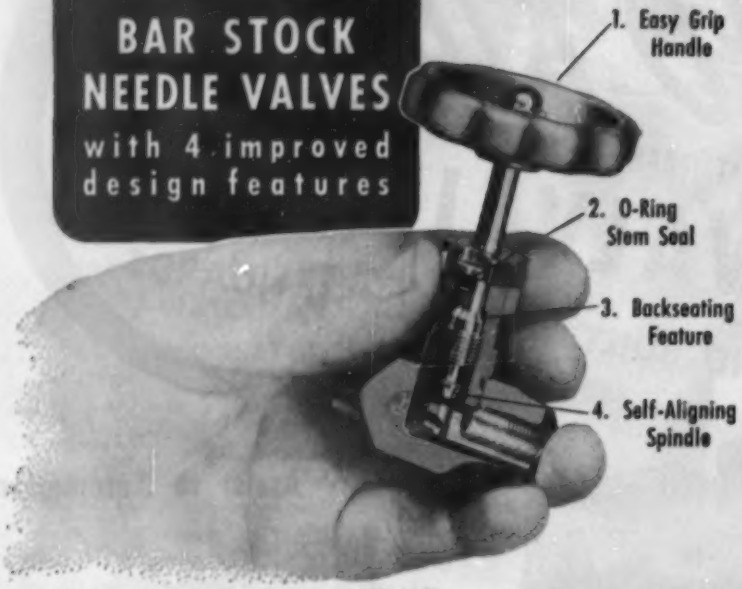
Rely Upon Valvair DIVERSATILITY

NEW

HOKE

BAR STOCK NEEDLE VALVES

with 4 improved design features



The newest and most versatile bar stock needle valve now available—that's the HOKE 270 series for instrumentation, test panel and hydraulic service. The O-ring stem seal provides maximum tightness and eliminates packing adjustments. (Conventional packing is available, however, if desired.) An important new advantage is the backseating feature that permits O-ring or packing replacement under pressure, without shutting down. A self-aligning spindle has been designed to insure tight seating with minimum wear. The easy-grip handle is of die-cast anodized aluminum, with no sharp edges. An additional feature makes possible direct instrument panel mounting. These new bar stock valves are now available in sizes from ⅛" to ½" pipe — straight and angle patterns — manufactured from brass, Type 316 or 430F stainless steel. O-ring styles can be helium leak tested for use in non-critical high vacuum service.

Write for the New Hoke Catalog

This completely illustrated 68-page catalog contains specifications on needle valves of all sizes as well as toggle valves, special purpose valves, fittings and accessories. Tell us about your problem and we will gladly send you a copy of the catalog with our specific recommendations. Address your request to 187 S. Dean Street, Englewood, N. J.

HOKE

HOKE INCORPORATED

Fluid Control Specialists

ENGLEWOOD, NEW JERSEY

Free Literature Offered in this Month's Ads

For more information circle numbers on the reader service card bound in this issue on page 136.

Bulletins EV-310 and CL-50 give detailed information on The Bellows Co. AIR CONTROL VALVE and other controlled air power products. The air control valve is electrically controlled and pilot operated to provide high speed automatic operation.

Circle 16 on Reader Service Card

A folder giving complete information on HYDRAULIC PUMPS in a variety of sizes, which develop pressures up to 5000 psi, is available from American Engineering Company. These piston-type, efficient, high pressure pumps offer many design benefits.

Circle 8 on Reader Service Card

Bulletin No. 4401 on PISTON PACKING for reciprocating pumps and bulletin no. 4502 on piston packing for air and hydraulic mechanisms are available from Darling Valve & Manufacturing Co.

Circle 33 on Reader Service Card

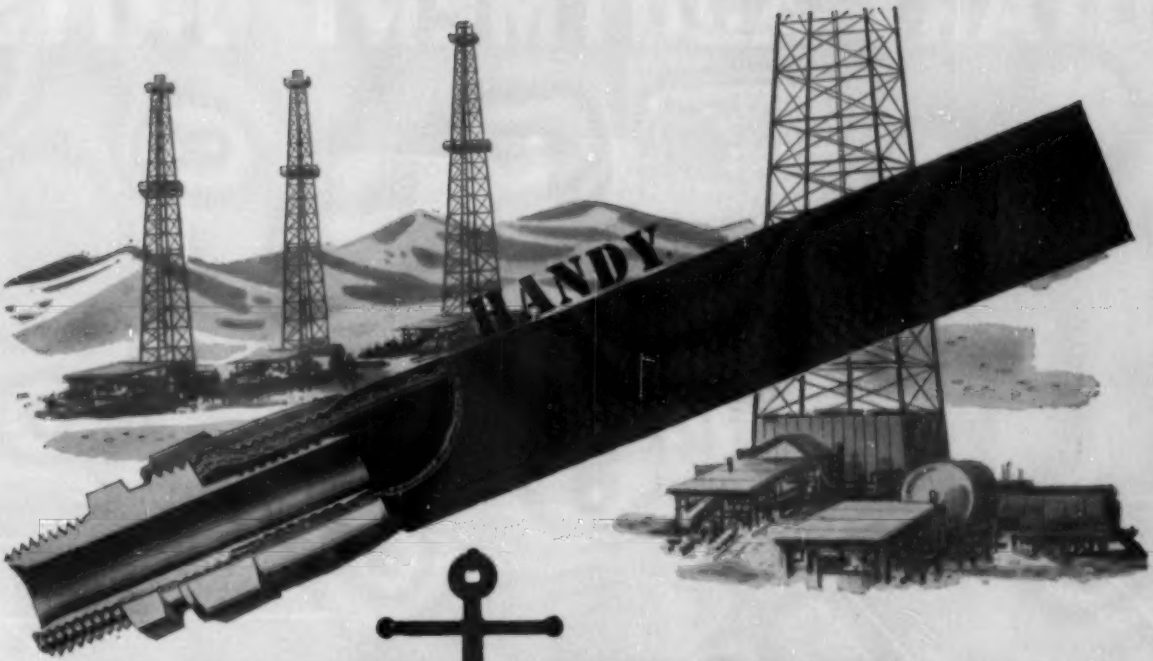
One-way and two-way shut off QUICK-CONNECTIVE FLUID LINE COUPLINGS are described in a catalog prepared by The Hansen Manufacturing Company. Also straight through couplings are included. The connection feature and the instant automatic flow or shutoff features are discussed.

Circle 67 on Reader Service Card

If you must SEAL oil, water, air, vacuum, or other fluids, an engineering handbook and technical literature, available from C. W. Marsh Company, will be of value.

Circle 89 on Reader Service Card

Continued on page 22



ANCHOR

REUSABLE COUPLING FOR TYPE QW HOSE

for original equipment and *fast field-repair*
— medium- and low-pressure service

Prevents leaks and blow-offs — exclusive patented grip gives extra safety, extra dependability, long life under severe service conditions.

Expensive downtime eliminated — repairs made immediately on the job without special tools.

Easy to assemble — vise, oilcan, and wrench are the only tools needed to assemble couplings and hose.

Reduces hose assembly inventory — carry one coil in hose sizes you use, and cut to lengths you need when you need them.

Can be used over and over.

Ample flow capacity.

NEW!
REVOLUTIONARY
ANCHOR FLANCO
SPLIT-FLANGE CLAMP
Positive leakproof connection without threaded joints. Bolt centers are located to distribute the forces evenly and prevent tilting of the clamp halves. Easy to assemble with small automotive-type wrench.

Find out how Anchor reusable couplings for type QW hose save time, trouble, money. Attach coupon to your letterhead and mail today.

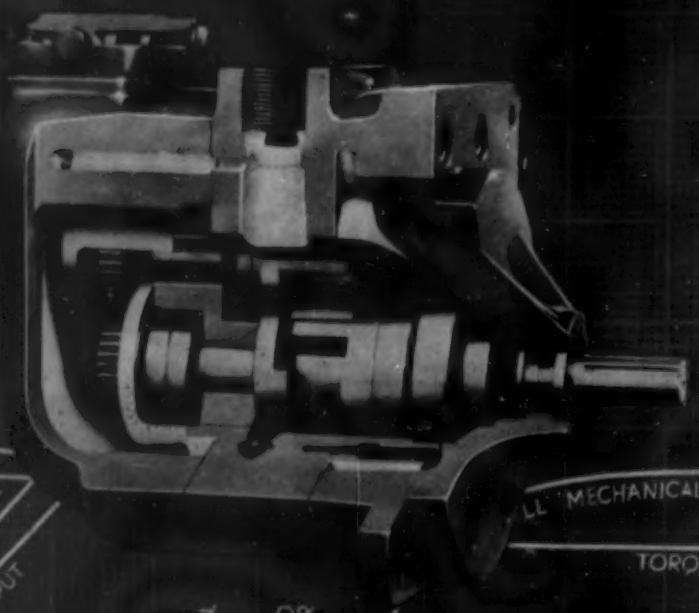
D-15

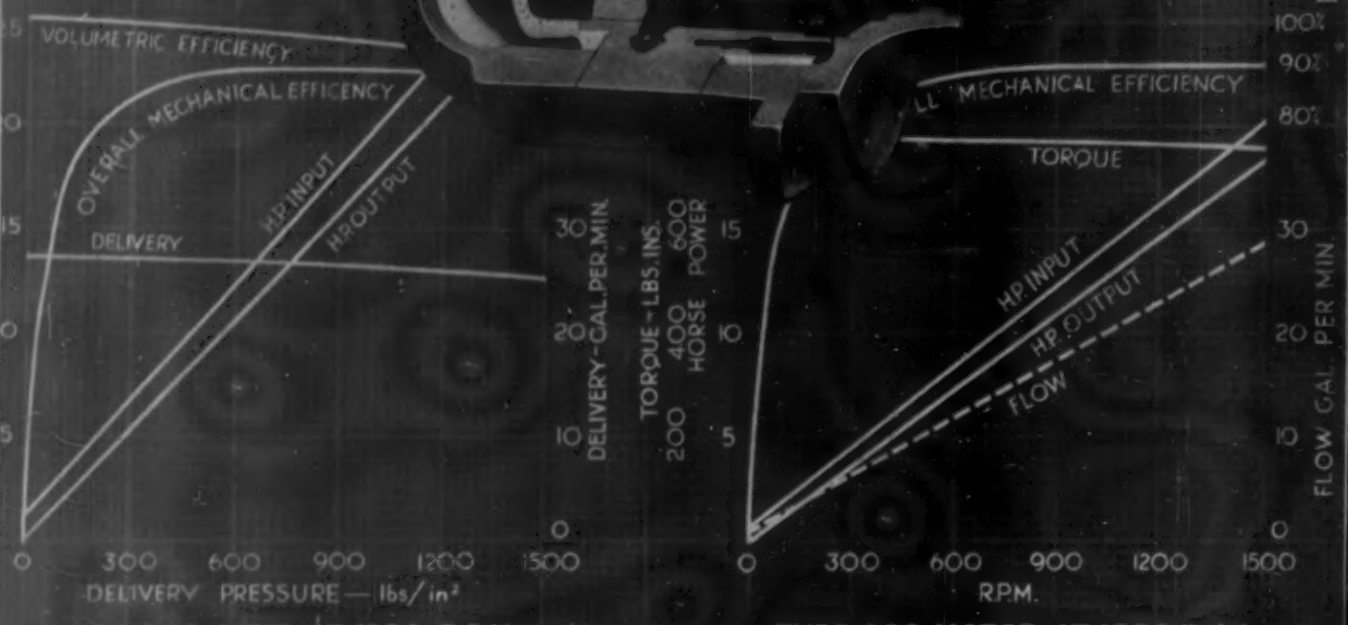
Anchor Coupling Co. Inc.
Dept. AH-54, Libertyville, Illinois
I'd like to know more about
☐ Anchor Reusable Couplings for type QW hose
☐ New Anchor Split-flange clamp-type coupling
Send me details.

Name..... Title.....
Company Name.....
Company Address.....
City..... State.....

ANCHOR COUPLING CO. INC.
Main Office and Factory: LIBERTYVILLE, ILLINOIS
FACTORY BRANCHES: DETROIT, MICHIGAN • DALLAS, TEXAS

ROTARY ABUTMENT UNITS





Keelavite
hydraulics

For high performance with economy

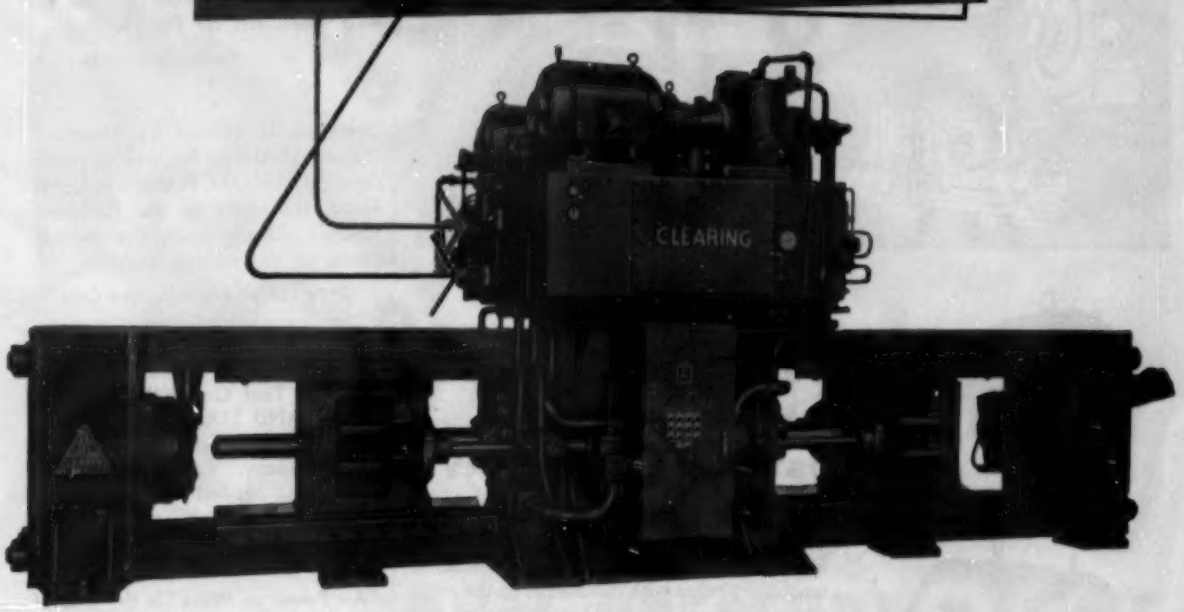
THE RECOGNISED AUTHORITY ON HYDRAULIC POWER TRANSMISSION

KEELAVITE ROTARY PUMPS & MOTORS LIMITED
ALLESLEY COVENTRY
Phone:- MERIDEN 225-6 & 384

Cogent

rapid-fire production of 90 mm shell cases no menace to properly cooled hydraulic oil

CLEARING DOUBLE-END PRESSES ARE ROSS EXCHANGER EQUIPPED



With a capacity up to 330 tons on each side, closing and returning speeds of 2200 ipm and a pressing speed of 200 ipm — this Clearing Double End Horizontal Press has been designed to produce large volumes of 90 mm shell cases to rigid ordnance specifications.

To maintain a combined three-pump capacity of 231 gpm, by preventing overheated, thinned oil, Clearing Machine Corporation equipped this press with Ross Type BCF Exchangers. *Dependable cooling is assured!*

Throughout the metal working industries, on numerous types and makes of prime equipment, Ross Exchangers are assigned the important job of keeping temperature under control: in engines, lubrication systems, compressors, centrifugal pumps, die casting machines, metal drawing presses, welders, speed increasers . . . and as quenching and cutting oil coolers.

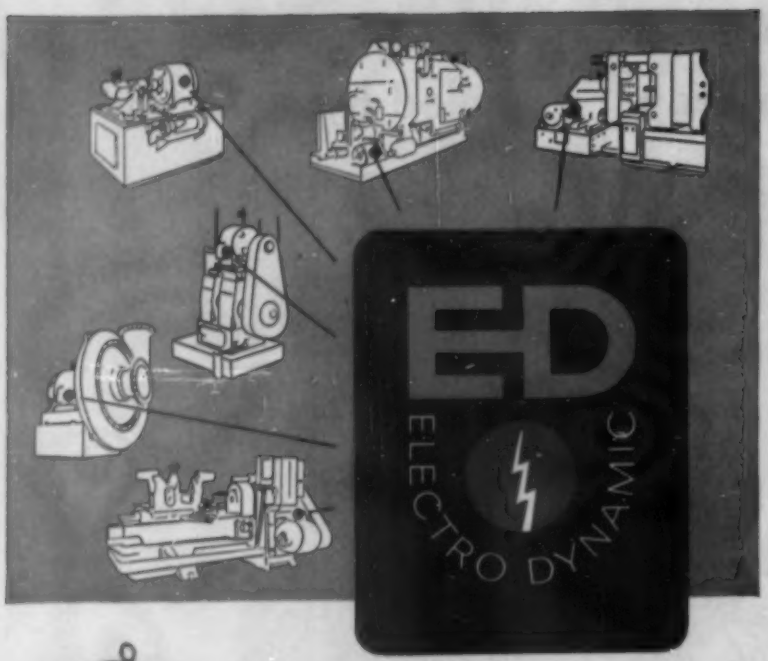
Widely preferred for their high thermal efficiency and extreme ruggedness, all copper and copper alloy Ross Type BCF Exchangers are pre-engineered, fully standardized and readily available.

For detailed information, request Bulletin 1.1K5.

KEWANEE-ROSS CORPORATION
DIVISION OF AMERICAN RADIATOR & STANDARD SANITARY CORPORATION
1464 WEST AVENUE • BUFFALO 13, N. Y.
In Canada: Kewanee-Ross of Canada Limited, Toronto 5, Ont.

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS • DUNHAM AIR CONDITIONING

← Circle 79 on Reader Service Card Circle 80 on Reader Service Card



THIS EMBLEM IDENTIFIES EXTRA DEPENDABLE INDUSTRIAL MACHINERY

The red *power spot* on industrial machinery means "Powered by Electro Dynamic." Such machinery relies with confidence on the *extra dependability* of Electro Dynamic motors, the proven industrial motors which give industrial equipment *extra dependable* operation.

Conclusive evidence of the *extra dependability* of Electro Dynamic motors is now revealed in the new candid report **"MOTOR SHOWDOWN"**. The revealing proof is found in *comparative tests** conducted in accordance with A.I.E.E. standards. Don't miss your copy! Send the coupon below *today*.

*Tests certified by J. Arthur Balmford, Professor of Electrical Engineering at a leading Eastern university.

1 to 250 hp. AC and DC. Standard or special purpose. N.E.M.A. standards.

ELECTRO *xtra* **DYNAMIC** *ependable motors*

ELECTRO DYNAMIC - *Division of General Dynamics Corporation*
170 Avenue A, Bayonne, New Jersey

Please send me a copy of "MOTOR SHOWDOWN" and the new catalog of Electro Dynamic industrial motors.

NAME_____
COMPANY_____
ADDRESS_____
_____

Free Literature Offered in this Month's Ads

Continued

Foster Mfg. Co. Inc., is offering descriptive literature on their new COUPLER for reciprocating air tools. This quick disconnect coupler can be used directly with reciprocating air tools without the use of lead hoses. Ask for FM-13.

Circle 50 on Reader Service Card

Literature is offered by Standard Pressed Steel Co. for their dryseal-thread PRESSURE PLUGS. In tightening, the roots of the flattened threads actually crush the sharper crests of the mating parts.

Circle 123 on Reader Service Card

Complete details of the Sundstrand Machine Tool Co. PUMP, RELIEF VALVE AND STRAINER UNIT can be obtained in literature offered by the company. Various pressure ranges and capacities are available.

Circle 125 on Reader Service Card

"Air Power at Work" is the title of a new booklet specially printed in color. The new 16 page photo booklet prepared by Mead Specialties Co. presents control examples in pictures and text, of 39 different and tough production problems, solved by various combinations of their AIR OPERATED DEVICES.

Circle 92 on Reader Service Card

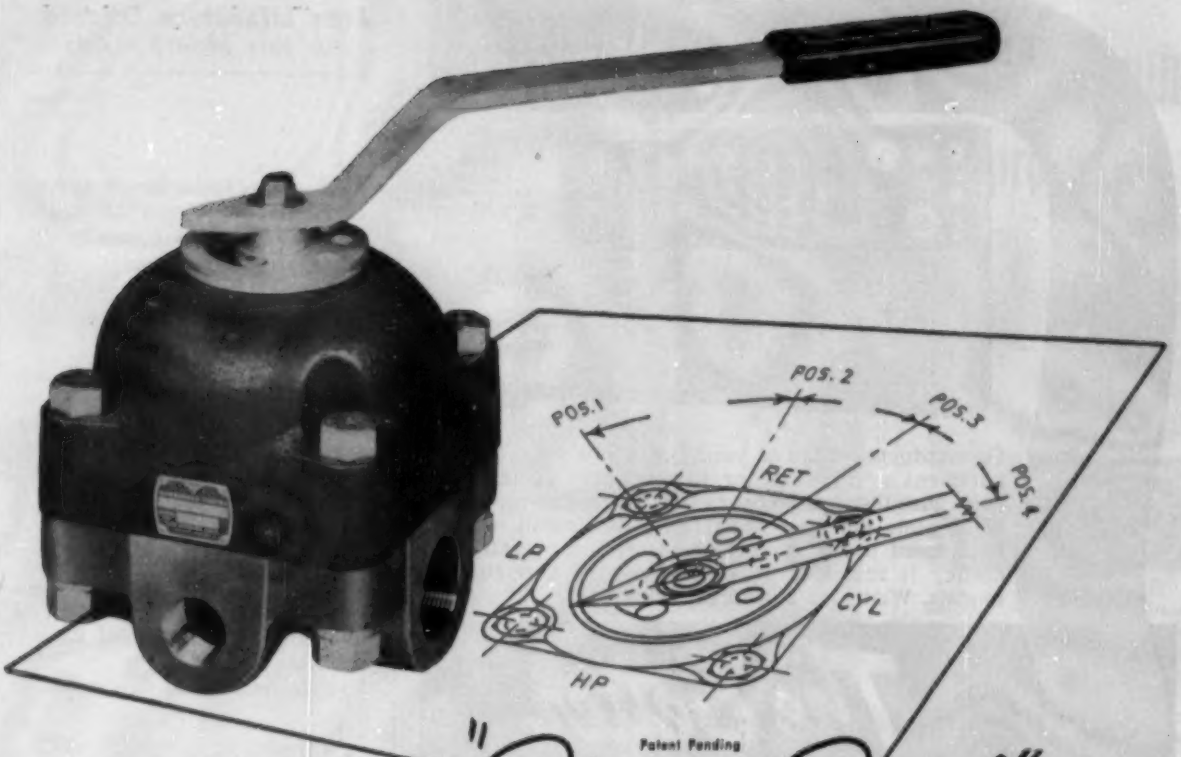
Literature and service data sheets are available from The American Crucible Products Co. on BEARINGS and BUSHINGS, which they manufacture. Castings are custom made to any size, shape or section.

Circle 7 on Reader Service Card

S. G. Frantz Co. Inc. has released bulletin PM-65 covering the subject of MAGNETIC SEPARATORS. How these units keep a hydraulic system free from ferrous particles, is discussed.

Circle 51 on Reader Service Card

Continued on page 24

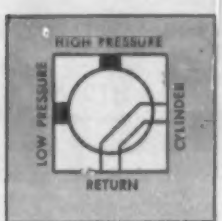


Patent Pending

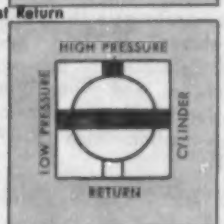
"Shear-Seal"

DUAL PRESSURE VALVES

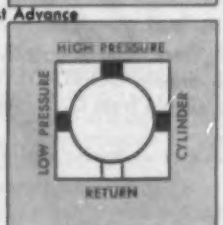
WATER AND OIL SERVICE TO 3000 P. S. I.



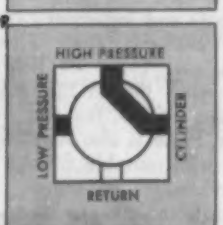
POS. 1: Fast Return



POS. 2: Fast Advance



POS. 3: Stop



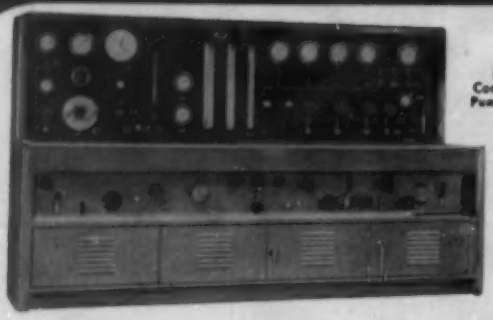
POS. 4: Bump and Squeeze

Especially developed to improve the control of accumulator operated presses. Effortless manipulation of the valve, with one hand, puts the press under your absolute control (see flow diagrams). The first and second position provide *fast* "return" and "advance" with throttling in between for "inching" the press to any desired degree. The "stop" position gives the operator a chance to hold everything instantly, perhaps to *check* rather than *wreck* the dies. And finally the high pressure position serves for "bumping" and the "squeeze." The most important reason why such a maneuverable valve is possible, lies in the *leak-proof* feature of the Barksdale "Shear-Seal" principle and its characteristic improvement with use.

For more complete information write for bulletin BVM-2 describing the "Shear-Seal" principle and Catalog 3G covering the valves.

BARKSDALE VALVES

5125 ALCOA AVE., LOS ANGELES 58, CALIF.



S-169
Hydraulic
Component and
Pump Test Stand

On conducted tours of your factory, is your test department a "must-see" or do you hurry visitors past it because test equipment being used is a hodge-podge of obsolete make-do units? Why not install *modern* equipment made by Sprague! Cost is moderate, efficiency is much improved. Standard and custom models. Write for bulletins.

The Better TEST MACHINES Bear this Trade Mark

SPRAGUE ENGINEERING & SALES CORPORATION

S-271-10
Portable Hydraulic Test Stand

S-404
Portable Hydraulic Power Unit

Sprague builds a complete line of hydraulic test machines ranging from the big test bench, Model S-169, illustrated at top, to various portable machines. Model S-271-10 is a rugged, heavy-duty machine built to take the roughest kind of airport service. Model S-404 is a small, inexpensive unit, designed for spot checks as well as system tests. Several companies buy the S-404 by the dozens for sub-assembly testing. Write for bulletins.

Circle 121 on Reader Service Card

Free Literature Offered in this Month's Ads

Continued

An illustrated folder describing typical examples of Warner HYDRAULIC EQUIPMENT is available by writing the company.

Circle 137 on Reader Service Card

Bulletins A-105 and H-104, released by Miller Fluid Power Co. covers their lines of CYLINDERS. Why these cylinders are ideal for automation applications, is described.

Circle 93 on Reader Service Card

New 8 page catalog and engineering data, covering "O" RINGS, is available from Plastic and Rubber Products Co.

Circle 109 on Reader Service Card

Hydraulic Hose Assembly catalog is now available from Carlyle Rubber Company, Inc. High, medium and low pressure HYDRAULIC HOSE ASSEMBLIES are presented.

Circle 23 on Reader Service Card

A comprehensive booklet, "Ucon Hydrolubes" (F-7380), gives detailed information on properties, advantages, and procedures for installation filtering and maintenance of this nonflammable HYDRAULIC FLUID.

Circle 21 on Reader Service Card

Data sheets, fully descriptive of air and hydraulic CONTROL VALVES, are available from C. B. Hunt & Son Inc.

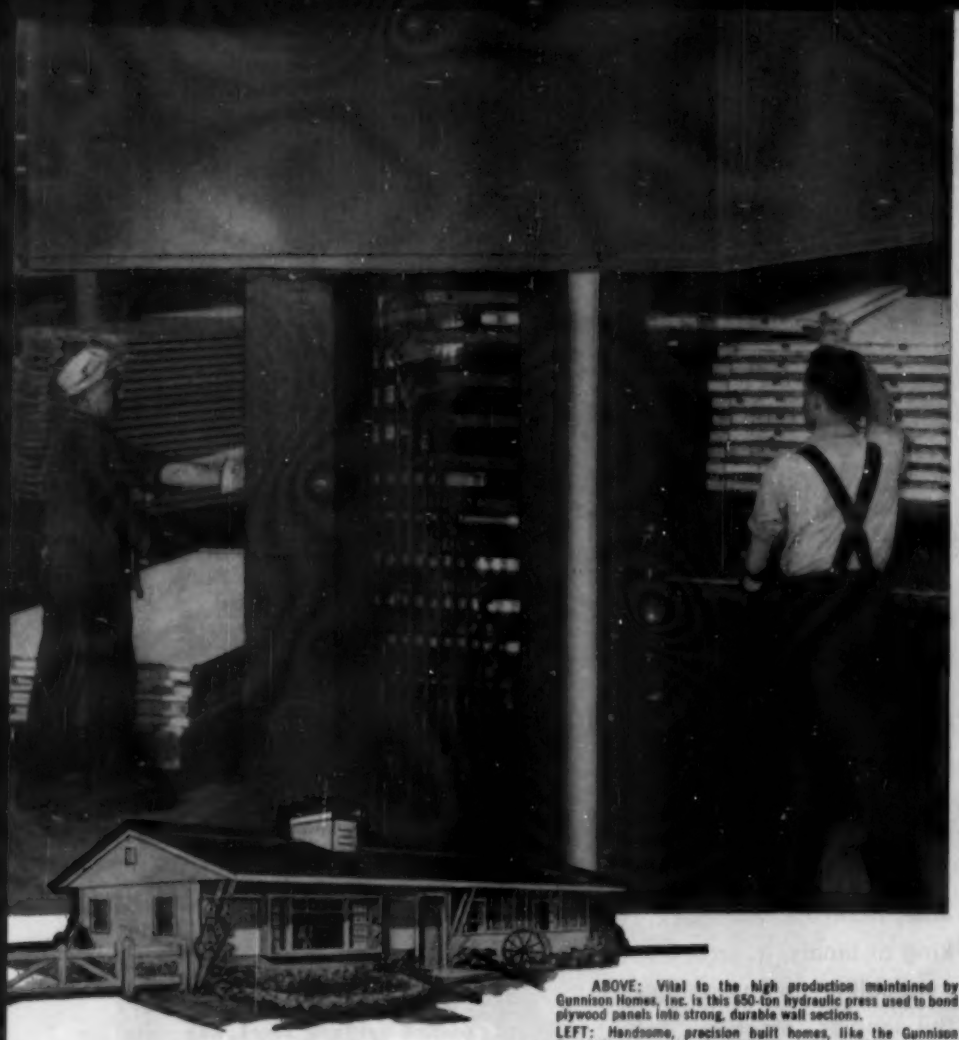
Circle 71 on Reader Service Card

Aircraft and industrial catalogs are now available from Flex-O-Tube Company. They will help you to determine the HOSE ASSEMBLY needed to do the job you want done. Hose is also supplied in bulk coils with reusable fittings for field assemblies.

Circle 48 on Reader Service Card

Continued on page 26

Circle 122 on Reader Service Card



ABOVE: Vital to the high production maintained by Gunnison Homes, Inc. is this 650-ton hydraulic press used to bond plywood panels into strong, durable wall sections.

LEFT: Handsome, precision built homes, like the Gunnison Coronado pictured here, are built in a matter of hours.

Answers a pressing need for Gunnison Homes, Inc. . . .

● Gunnison Homes, Inc., situated in New Albany, Indiana, is one of the leaders in the field of manufactured homes. Key to continuous production of precision built homes at the New Albany plant is the 650-ton hydraulic press, shown above, which was installed in 1947. This press processes ten plywood panels every cycle by the combination of heat and pressure . . . a tough job and one requiring reliable hydraulic performance to maintain production schedules.

STANOIL TRADE MARK **Industrial Oil**

STANOIL Industrial Oil was installed in the press when it was put into operation six years ago. STANOIL has stood the test of severe operation . . . with no evidence of oil deterioration being found during a recent inspection of the hydraulic system. Operation has been efficient. Minimum make-up oil has been needed to maintain the oil capacity of 450 gallons.

Find how STANOIL can benefit you by discussing this multi-purpose oil with a Standard lubrication specialist. You can contact him by phoning your local Standard Oil office. Or, write: Standard Oil Company, 910 S. Michigan Ave., Chicago 80, Ill.

What's YOUR problem?

Ralph E. Murnahan, of Standard Oil's Evansville office, is the lubrication specialist who keeps in constant contact with Gunnison Homes to make certain that there is no interruption of operation due to lubrication difficulties.

He is one of many lubrication specialists who make their headquarters in Standard's offices throughout the Midwest. These men have been specially trained in Standard's Lubrication Engineering Schools and, in addition, have a wealth of on-the-job experience.

To obtain the service of the lubrication specialist in your area, you need only call your local Standard Oil office. The lubrication specialist will discuss your lubrication problems with you . . . at no obligation to you, of course. He has a complete line of petroleum products to offer you, including:

SUPERLA Greases—Available in a wide range of consistency grades and in both lime-soap and soda-soap types. SUPERLA Greases cover a wide range of operations. These efficient products are comparable in quality with the highest type of special greases.

STANOLITH Greases—Because these unique lithium soap products possess the heat resistant properties of soda-soap greases and the water resistant properties of lime-soap greases, they offer a solution to lubrication problems caused by the presence of both heat and water.

STANDARD OIL COMPANY (Indiana)

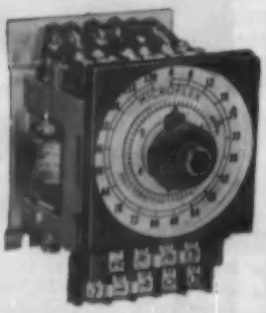
STANDARD

Automation

STARTS WITH

EAGLE *Timers*

FOR ANY SIZE INDUSTRY



Eagle industrial timers are playing an important role in the new era of automation.

Eagle manufactures the most complete line of timers available, from the "Microflex", the king of timers, in accuracy, dependability and versatility, to the simpler "Monopulse".

Let experienced engineers suggest the right timer to increase profit in your individual process. Send your problem to Eagle today.

MICROFLEX
Bulletin 110

MONOPULSE
Bulletin 322

Write for **FREE BOOKLET**
"See What Timing Can Do For You"

Industrial Timers by **EAGLE**

EAGLE SIGNAL
CORPORATION
MOLINE, ILL.

Free Literature Offered in this Month's Ads

Continued

Rotary geared, mechanically sealed PUMPS for hydraulic systems with pressures to 500 psi are fully described in catalog no. 35P, released by Brown & Sharpe Mfg. Co.

Circle 19 on Reader Service Card

HYDRAULIC HOSE COUPLINGS and FITTINGS for many applications are described in catalog 101 offered by Eastman Manufacturing Company. Various hose designs of 1 and 2 wire braid, 1 and 2 fabric braid and spiral wire hose are included.

Circle 43 on Reader Service Card

Pneu-Trol Devices, Inc. are offering an illustrated circular and price list for their hydraulic and air VALVE line. Sizes, features and types manufactured are presented.

Circle 110 on Reader Service Card

High pressure needle and globe VALVES with J.I.C. and AN standard tube ends are described in literature available from Republic Manufacturing Co. All sizes and operating ranges are included.

Circle 116 on Reader Service Card

Steel HYDRAULIC COUPLINGS are described in catalog #53 released by L & L Manufacturing Co. New products such as a 5000 psi needle valve, ball check valves, 1200 psi swivel elbows and pipe nipples are included.

Circle 82 on Reader Service Card

Interested in AIR CYLINDERS? Write for bulletin 454 offered by The Tomkins- Johnson Co.

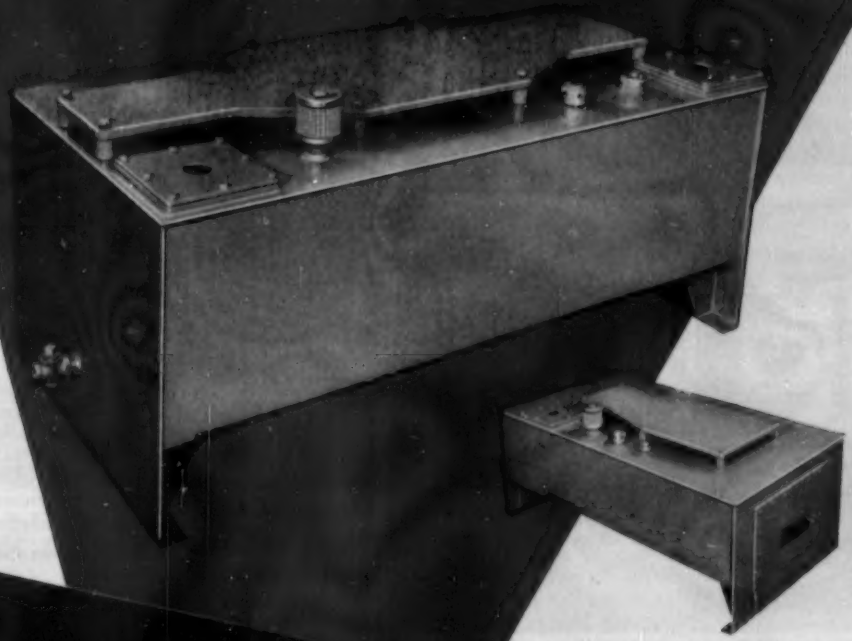
Circle 129 on Reader Service Card

If you use HYDRAULIC TUBING, bulletin 38, catalog section 30 will be useful to you. The literature released by Superior Tube Company, covers the subject thoroughly.

Circle 124 on Reader Service Card

Continued on page 28

Announcing A New Service For Equipment Manufacturers



Ready-Made Hydraulic Tanks (J.I.C. Standards) **For Power Units...**

A complete line of Cardwell Hydraulic Reservoirs fully equipped with Reservoir Components are now available to the Hydraulic Industry. Cardwell tanks (J.I.C. Standards) have established an enviable record in the Industry and you will find these units ideal for your Hydraulic Assemblies. Write for catalog or price quotations for standard or special sizes.

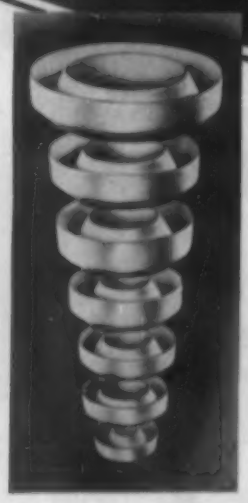
The CARDWELL MACHINE COMPANY

A CARDWELL TRADITION SINCE 1837

FRANKLIN AT 20th STREET, RICHMOND 11, VIRGINIA, U.S.A.

"JOHN CRANE"

TEFLON* "C-V" rings



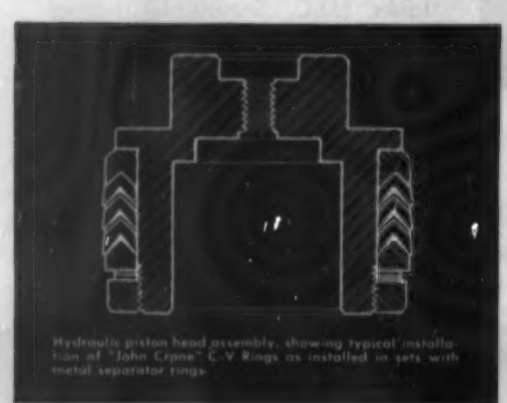
First preference in hydraulic service everywhere! because...

Teflon "C-V" Rings withstand

1. **Temperature from −94° to +482°F.**
2. **Any type hydraulic fluid**

Why repack with ordinary materials when corrosively inert "John Crane" Teflon "C-V" Rings will effectively seal any hydraulic fluid, including the newly developed synthetics, and resist high temperatures as well. Also, they have extremely low friction characteristics—will not shrink, swell, harden, dissolve, corrode or deteriorate. Ideal for use on hydraulic cylinders, valve stems, reciprocating, centrifugal and rotary pump applications. Cross-section design allows effective sealing at finger-tight gland pressure.

"John Crane" has developed a complete line of standard size Teflon "C-V" Rings and male and female adapter rings to meet practically every need. If you have special requirements, "John Crane" can mold additional sizes to fit your stuffing box requirements.



Hydraulic piston head assembly, showing typical installation of "John Crane" C-V Rings as installed in sets with metal separator rings.

Send for complete information, including this illustrated technical booklet, "The Best in Teflon."
Crane Packing Co., 1805 Cuyler Ave., Chicago 13, Ill.
In Canada: Crane Packing Co., Ltd., 617 Parkdale Ave., N., Hamilton, Ont.

*Du Pont trademark

JOHN CRANE

CRANE PACKING COMPANY

Free Literature Offered in this Month's Ads

Continued

More complete information on Cuno Engineering Corp. filters can be obtained from the company. A filtration analysis form can be secured for the asking.

Circle 32 on Reader Service Card

The important job of KEEPING TEMPERATURES UNDER CONTROL in hydraulic systems, lubrication systems, compressors, centrifugal pumps and engines is presented in bulletin 1.1K5, released by Kewanee-Ross Corp.

Circle 80 on Reader Service Card

Specifications in addition to those available in this month's ad, may be obtained on the 4-way SOLENOID VALVE, from Skinner Electric Valve Div., The Skinner Chuck Co., by asking for bulletin no. 532.

Circle 118 on Reader Service Card

Literature may be secured from M-B Products on their automatic air line FILTER, REGULATOR and LUBRICATOR assembly.

Circle 91 on Reader Service Card

Further information can be obtained from E. B. Wiggins Oil Tool Co. Inc., on 3000 psi quick-disconnect COUPLINGS, for low and high pressure hydraulic fluids and pneumatic systems.

Circle 141 on Reader Service Card

Double acting AIR CYLINDERS for air and water are described in literature available from The A. K. Allen Co.

Circle 6 on Reader Service Card

INJECTION MOLDED "O" RINGS is the subject of a bulletin prepared by Minnesota Rubber & Gasket Co. "O" rings and other small rubber parts are produced by the injection molding process where extreme uniformity and tolerance requirements are desired.

Circle 94 on Reader Service Card

Circle 31 on Reader Service Card

Circle 101 on Reader Service Card

OILGEAR DRIVES ON GLAMORGAN CENTRIFUGAL PIPE CASTING MACHINE

Something more than 5 years ago, the Glamorgan Pipe & Foundry Company, of Lynchburg, Va., a leading manufacturer of cast iron pipe, designed its own centrifugal pipe casting machine, using Oilgear Fluid Power equipment to tilt the ladle and move the casting carriage.

The degree of control over pouring rate and carriage travel afforded by Oilgear has had almost unbelievable results. Scrap caused by irregularities in moving parts has become negligible. Weight controls are well within the close limits set by Industry specifications. Only 3 men are needed to operate the equipment. Despite the fact the machine has averaged 500 operations per day since 1948, maintenance on Oilgear equipment has totaled less than $200.00. The fumes and dirt necessarily present in foundry operations have had no effect on Oilgear fluid power equipment.

TYPICAL OF OILGEAR'S ABILITY TO SOLVE MACHINE DESIGN PROBLEMS

Sure it takes power to tilt a ladle and move a pipe casting machine carriage. But above all, it takes absolute and precise control of the speed of pouring and the speed of carriage travel if the product is to be perfect and uniform.

It not only takes power but power under control to print in register on flimsy cellophane at high speed, to set up paper piles for repetitive serial cuts to hairline register automatically, to cut fish on a continuous conveyor to accurate weight for canning, to vary the speed of a large beater automatically to conform sensitively to the changing viscosity of the mass.

These are all triumphs of Oilgear Fluid Power—where this flexible, controllable, versatile power leads the way to better machine design or to the solution of hitherto unsolved problems.

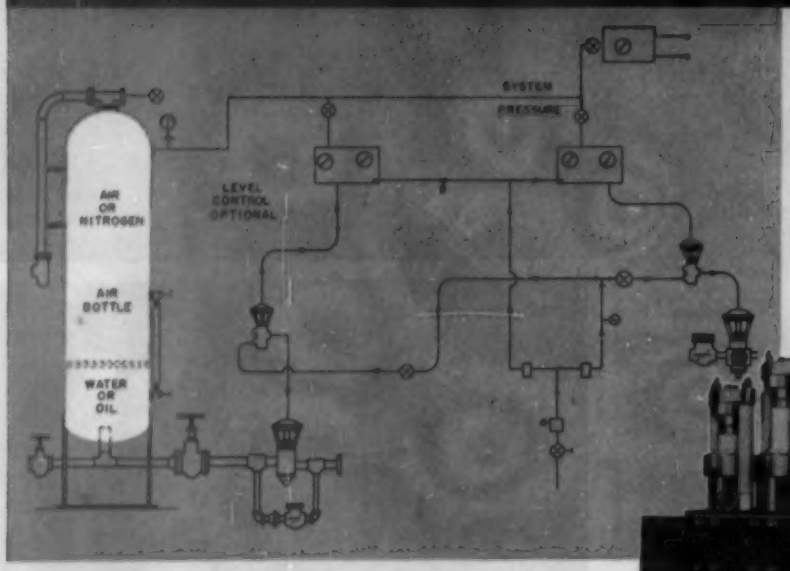
Think of Oilgear Fluid Power as identical with electrical power . . . generated by a pump . . . applied over conductors through a motor or motor element. But Oilgear Fluid Power can be converted into linear movement as well as rotary; can be exerted statically, without motion; can be varied infinitely, steplessly without additional equipment.

And the unique Oilgear design is oil hydraulic design at its simplest and best. It is generally accepted as the leader in its field. It will cost you nothing to see what Oilgear can do to improve the salability of your equipment . . . may profit you and your users in an amazing degree. THE OILGEAR COMPANY, 1564 W. Pierce St., Milwaukee 4, Wisconsin.

OILGEAR

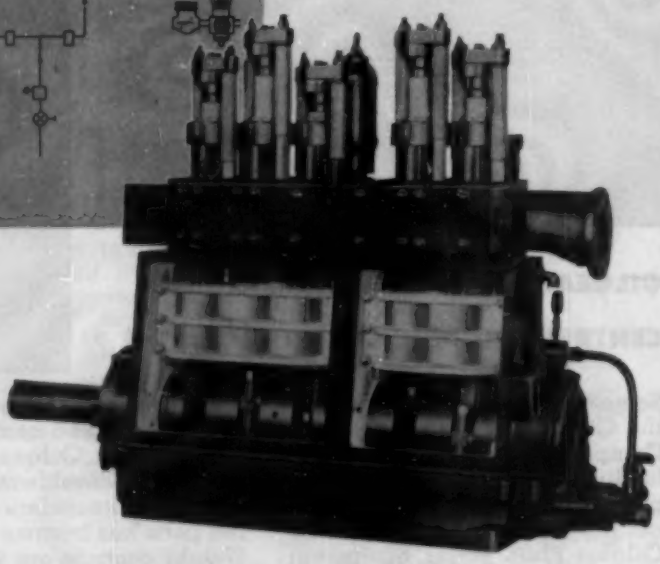
OILGEAR

EFFICIENT-ECONOMICAL



One source of hydraulic power instead of many . . .

minimum investment
less maintenance and repair
greater efficiency
lower operating cost



Aldrich central hydraulic systems . . . for oil or water

A single, concentrated source of efficient hydraulic power is wise economy and sound engineering.

A single Aldrich Pump can supply all your presses and equipment—at a considerable saving. And if fire is a hazard, remember Aldrich design permits pumping *either* oil *or water*. Pumps are built in 3″, 5″, 6″ and 8½″ stroke, ranging from 24 to 2500 hp.

Aldrich Pumps are integral parts of complete Aldrich Central Hydraulic Systems—designed to suit your needs and built to exacting standards.

the ALDRICH *pump company*

. . . Originators of the Direct Flow Pump

14 GORDON STREET • ALLENTOWN, PENNSYLVANIA

Representatives: Birmingham • Bolivar, N. Y. • Boston • Buffalo • Carmi, Illinois • Charleston, W. Va. • Chicago • Cincinnati • Cleveland • Dallas • Denver • Detroit • Duluth Houston • Los Angeles • New York • Oakland, Calif. • Philadelphia • Pittsburgh • Portland, Ore. • Richmond, Va. • Rochester • Salt Lake City • San Francisco • Seattle Somerville, Mass. • Spokane, Wash. • Syracuse • Tulsa • Washington, D. C. • Youngstown • Export: Petroleum Machinery Corp., 30 Rockefeller Plaza, New York 20, N. Y.

Circle 5 on Reader Service Card

Circle 93 on Reader Service Card

Automation with Miller CYLINDERS

...assures non-stop production flow with BIG savings in maintenance and investment cost!

The production magic of "AUTOMATION" demands faultless performance—as the failure of one important component of "automation" machinery and equipment can shut down an entire manufacturing process.

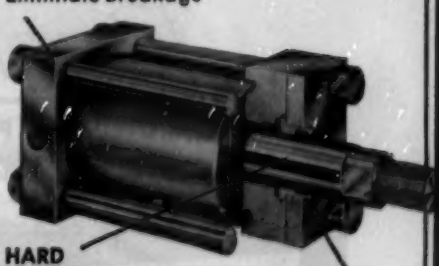
In the "automation" application illustrated above, 22 Standard Miller High Pressure Hydraulic Cylinders are employed on each of two identical automotive transfer machines built by Ex-Cell-O Corp. of Detroit, Michigan, a recognized leader in the design and manufacture of "automation" equipment.

The machines perform—simultaneously and automatically—drilling, countersinking, counterboring, and tapping operations on automotive cylinder heads. And the Miller Cylinders accomplish the vital clamping, feeding, holding, rotating and locating operations that enable the machines to function as smooth "automation" production units.

Miller Cylinders are ideal for such "automation" applications. They withstand severest shock loads, provide millions of smooth strokes without repacking of seals or other maintenance. Their space-saving square design cuts installation and designing costs. They're available in an infinite variety of versatile power and stroke units that cover every need and permit the most economical choice for the application. And they fully meet the J.I.C. Standards.

Consult our engineering department or local representative. And write for complete information on this and other interesting applications and for our FREE Cylinder Bulletins A-105 and H-104.

SOLID STEEL HEADS, CAPS and MOUNTINGS Eliminate Breakage



HARD CHROME PLATED PISTON RODS Prevent Scratch-Damage, Nicks and Rust

DIRT WIPER SEALS Protect Rods, Seals, Bushings

SALES AND SERVICE FROM COAST TO COAST

CLEVELAND • YOUNGSTOWN • DAYTON • PITTSBURGH • PHILADELPHIA • BOSTON • HARTFORD • NEW YORK CITY • BUFFALO • ST. PAUL • GRAND RAPIDS • DETROIT • FLINT • FORT WAYNE • SOUTH BEND • INDIANAPOLIS • MILWAUKEE • LOUISVILLE • KANSAS CITY • SEATTLE • LOS ANGELES • SAN FRANCISCO • BALTIMORE • DENVER • ST. LOUIS • MOLINE • CHICAGO • HOUSTON • TORONTO, CANADA and OTHER AREAS

MILLER FLUID POWER CO.

2008 N. Hawthorne Ave., Melrose Park, Ill.

Qualifying for use on Air Force and Navy aircraft, this 3,000 lb. MIL-AN-6248 hydraulic hand pump, manufactured by GLADDEN PRODUCTS CORP., 635 W. Colorado, Glendale 4, Calif. underwent a test of 70,000 full cycles—only one change of "O"-Rings was allowed, and volumetric efficiency had to stay at not less than 75%. *The pump, however, equipped with Parco "O"-Rings, finished the rigorous test with a remarkable efficiency rating of 97.8%—with no change of "O"-Rings!* Another example of the extra durability of Parco "O"-Rings—it pays off in better products, greater efficiency and lower costs! All dash numbers of AN 6227, AN 6230, AN 6290, MS 29512 and MS 29513 series for commercial or Army-Navy installations to Specifications MIL-P-5516A, MIL-G-5510A and MIL-P-5315A are available from stock. Silastics and other special compounds supplied on order.

New 8-page catalog and engineering data on request. Write us today.

Parco

PLASTIC AND RUBBER PRODUCTS CO.

3100 Hyde Park Boulevard, Los Angeles 47, California
3140 West Irving Park Road, Chicago 18, Illinois

Valve to Handle Fluid with Grit

For some time I have been trying to find a solenoid operated valve which would handle coolant. All the valves I have found are constructed in such a way that grit in the fluid being controlled, damages the spool and seat.

In grinding we cannot be sure that all grit is removed from the coolant by the filtering system. Could you recommend some manufacturer who makes a valve meeting these requirements: size - 1¼ in; 110 volt solenoid operation, normally open, must be able to handle fluids containing grit. Operation will be 25 times per hour maximum.

R. C. HURSOM
The Gear Grinding
Machine Company
Detroit, Mich.

We have sent you the names of several valve manufacturers who may work with you to develop a valve which will operate satisfactorily under these severe conditions. It is quite possible that readers of APPLIED HYDRAULICS who have been faced with a similar problem will have further suggestions to offer.

Hydraulic Circuit Problem

We are interested in powering two hydraulic arbor presses and two hydraulic riveting tools from one central hydraulic pump unit.

We are wondering if you could advise use if this can be done satisfactorily. All of the above operations will be going on at the same time and we are desirous of finding the best method of holding clamp pressures on any one of the cylinders while the others are opening and closing performing their various operations.

Can a system of check valves and accumulators be worked out to per-

Continued on page 34

FOR PRESSURES UP TO 5000 P.S.I.

HYDRAMITE

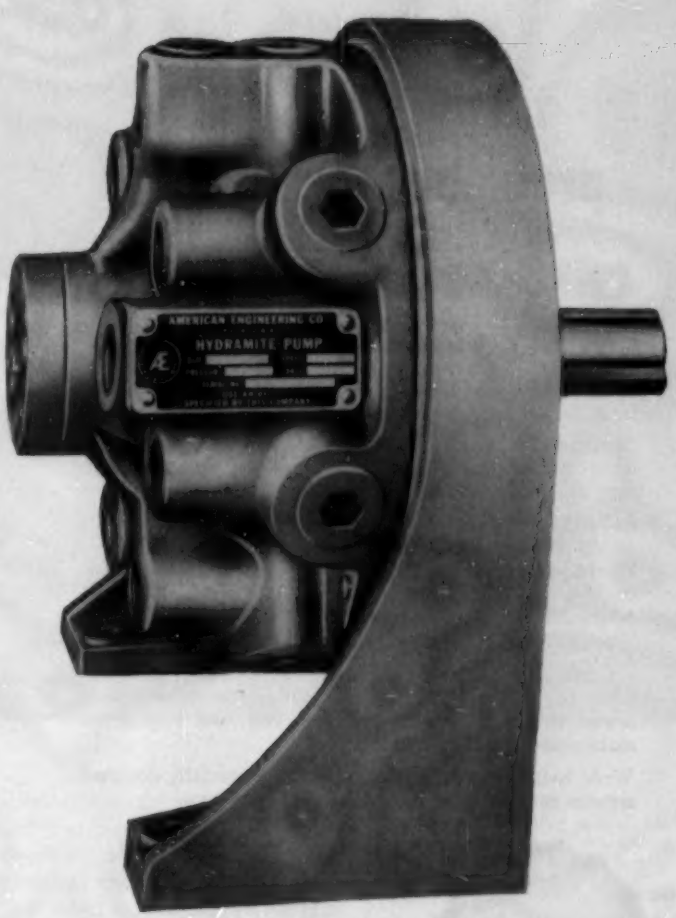
IS TODAY'S BEST PUMP... AND COSTS LESS

IN THE FEW YEARS since the Hydramite Pump was introduced it has become the top choice for an ever-increasing range of hydraulically-operated equipment... and has unfailingly brought the efficiency and economy which are always associated with products of the American Engineering Company.

The Hydramite Pump is available in a variety of sizes... develops pressures up to 5000 p.s.i. It operates on any of the makes and viscosities of oil which are suitable for hydraulic circuits.

• • •

Write for folder giving full information on the unique Hydramite Pump... and call on AE engineers or representatives for recommendations regarding possible applications.



WHEN IT'S HIGH PRESSURE, IT'S **AMERICAN!**

AMERICAN ENGINEERING
COMPANY
PHILADELPHIA 25, PENNA.
IN CANADA: AFFILIATED ENGINEERING CORPORATIONS, LTD., MONTREAL 2, CANADA

AE Products are: Taylor and Perfect Spread Stokers, Marine Deck Auxiliaries, Hele-Shaw and Hydramite Fluid Power, Le-Ned Hoists, Le-Ned Car Pullers.

American Engineering Company
2530 Aramingo Avenue, Philadelphia 25, Pa.

Gentlemen: Kindly send me complete information about the Hydramite.

Name.....Title.....
Company.....
Address.....
City.....Zone.....State.....

SOLVED

weighing and testing problems by

EMERY force-measuring systems

Emery load cells offer the fundamental solution to *any* force-measuring or weighing problem.

Operating on simple, basic physical principles, Emery systems are maintenance-free. Some units have been in service over 25 years without even recalibration!

RANGES: 0 - 10,000,000 pounds . . . **ACCURACY:** 1/10 of 1% of range . . . **RESPONSE:** less than ½ second . . . **TYPES:** self-contained hydraulic, open-flow hydraulic, pneumatic . . . **CELL DEFLECTION:** less than 0.005" . . . **APPLICATIONS:** Weighing, Jet Engine Thrust, Brake Testing, Torque Measurements, Strength of Materials, Process Control, Tank Weighing, Platform Scales, Etc.

Since 1872, Emery Force-Measurement Systems have been lowest in initial cost, in operating cost, and require no maintenance.

Write today for information on stock or specially designed systems to solve your force-measuring problems.

THE A. H. EMERY COMPANY, NEW CANAAN 9, CONN.

Please send me
☐ Literature on hydraulic weighing
☐ Literature on pneumatic weighing
NAME _____
POSITION _____
Attach to, or write on, your company letterhead.

Letters to the Editor

Continued

form satisfactorily? Do any of the past issues of APPLIED HYDRAULICS have anything to offer in regards to this problem of using a central pump system to operate several hydraulic units of the same system. Our hydraulic operating pressure is between 1000 and 1500 psi.

ROBERT O. KELLY
Air Power Equipment Corp.
Saint Paul, Minn.

Your intention to power two hydraulic presses and two hydraulic riveting tools from one power unit is very practical. In selecting the power unit, the pump should have a maximum pressure rating of 2000 psi and a capacity in gpm sufficient to move all cylinders simultaneously in the desired cycle time.

Holding clamp pressure on any cylinder while others are being operated can be efficiently done with pilot check valves. You may want to use a variable volume or double pump arrangement. Your operating cycle would determine the pump choice. We are sending you a circuit sketch which we hope will be of assistance.

Needs Automatic Bleeder Valve

We are presently performing some development work on a hydraulic control system and would appreciate any information you might be able to give us regarding the manufacture of an automatic air vent valve.

C. E. TRIPPE
H. C. Downer & Associates
Cleveland 15, Ohio

Two articles published in APPLIED HYDRAULICS offer suggestions on automatic air bleeding. "Trapped Air in Hydraulic Systems" by J. E. C. Stringer and K. N. Hastings, Vickers-Armstrongs Ltd., Elswick Works, Newcastle-upon-tyne, England, May, 1952, and "Automatic Bleeding of Air in Hydraulic Systems" by Milton Adler, mechanical engineer, New York City, June, 1953 should be helpful to you. If you contact the authors

Continued on page 36

Circle 47 on Reader Service Card

Circle 125 on Reader Service Card

Low-cost solution to low-pressure pumping... SUNDSTRAND'S Rota-Roll Pump

SUNDSTRAND

Here's a "ready-made" answer for solving problems of engine and bearing lubrication, small cylinder actuation, low-capacity oil transfer, and many other similar applications. Sundstrand's Rota-Roll Pump gives you a pump, relief valve, and strainer in an extremely compact unit, making it particularly adaptable where space is limited. Pump is Rota-Roll design . . . inner member keyed to shaft turns outer member at 25% slower speed. This, plus precise hydraulic balance of pumping members, insures smooth operation, long life. Volumetric efficiency is approximately 90%.

Adjustable relief valve can be furnished in any of four pressure ranges: 20-40 psi; 40-80 psi; 80-150 psi; 150-300 psi. Large, easy-to-clean strainer is readily accessible, easily removed for cleaning. Husky 7/16" shaft and long, self-lubricating shaft bearing permit mounting for pulley operation. High-speed production line methods give you a complete, compact unit at an exceptionally reasonable price. Thorough factory testing insures unit is ready for immediate use without further checking. Write, wire, or phone for complete details today.

CAPACITIES UP TO
80 gph—depending on operating speeds and pressures. Will operate at speeds up to 3600 rpm

PUMP, RELIEF VALVE, STRAINER
—in one small compact housing

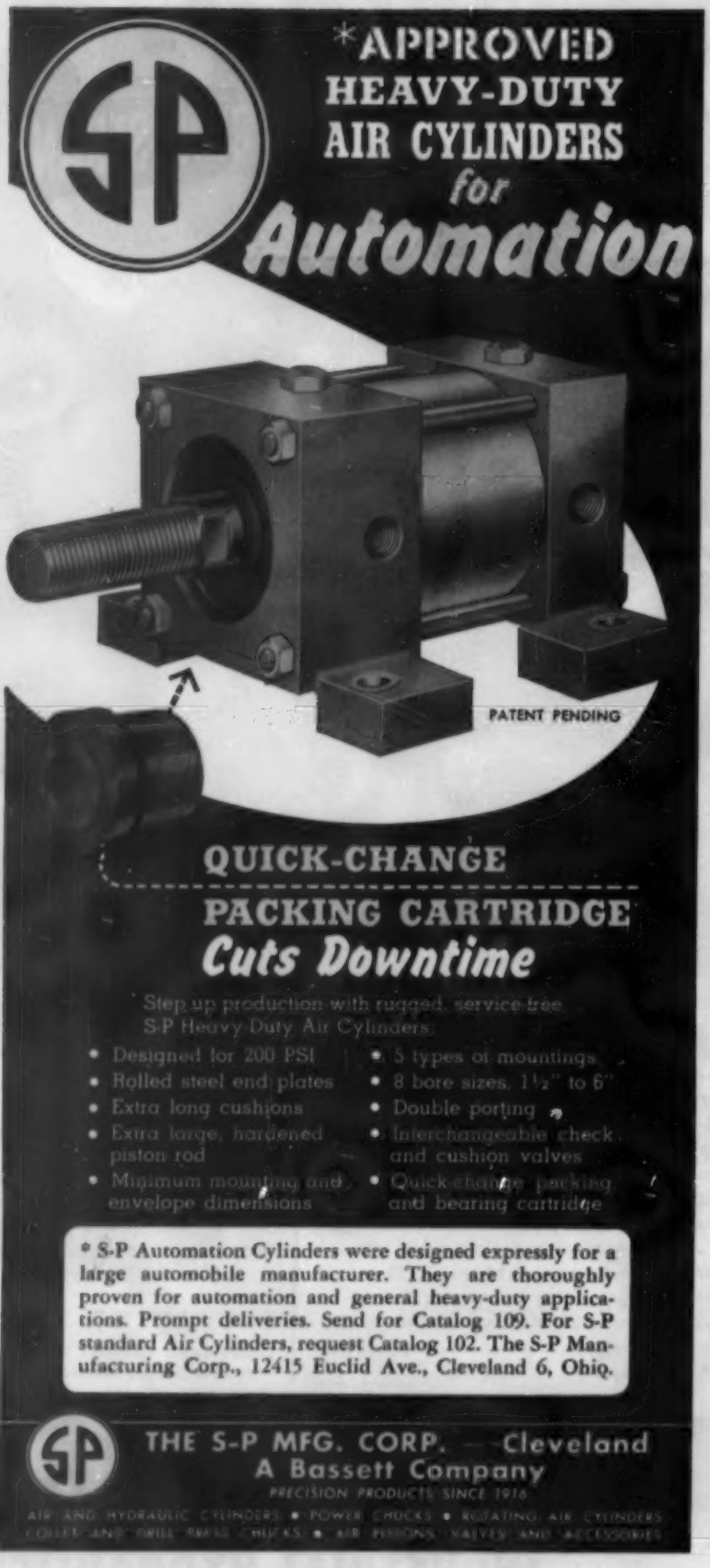
HIGH VOLUMETRIC EFFICIENCY
—90% maintained over long operating periods

THOROUGH FACTORY TESTING
—delivered for immediate use

SUNDSTRAND MACHINE TOOL CO.
Hydraulic Division, Rockford, Illinois

SUNDSTRAND

A name to remember in **INDUSTRIAL HYDRAULICS**


SP
*APPROVED
HEAVY-DUTY
AIR CYLINDERS
for
Automation
PATENT PENDING
QUICK-CHANGE
PACKING CARTRIDGE
Cuts Downtime
Step up production with rugged, service-free S-P Heavy-Duty Air Cylinders.
• Designed for 200 PSI
• Rolled steel end plates
• Extra long cushions
• Extra large, hardened piston rod
• Minimum mounting and envelope dimensions
• 5 types of mountings
• 8 bore sizes, 1½" to 6"
• Double porting
• Interchangeable check and cushion valves
• Quick-change packing and bearing cartridge
* S-P Automation Cylinders were designed expressly for a large automobile manufacturer. They are thoroughly proven for automation and general heavy-duty applications. Prompt deliveries. Send for Catalog 109. For S-P standard Air Cylinders, request Catalog 102. The S-P Manufacturing Corp., 12415 Euclid Ave., Cleveland 6, Ohio.
SP
THE S-P MFG. CORP. — Cleveland
A Bassett Company
PRECISION PRODUCTS SINCE 1916
AIR AND HYDRAULIC CYLINDERS • POWER CHUCKS • ROTATING AIR CYLINDERS
COLLET AND DRILL PRESS CHUCKS • AIR PISTONS, VALVES AND ACCESSORIES

Letters to the Editor

Continued

of these articles, they will supply you with information concerning the availability of their bleeder valves for your application. Greer Hydraulics, Inc. recently introduced a semi-automatic bleeder valve which may be suitable for your job.

Sintered Carbon Seal

We hear that there is a new type of seal now available, manufactured from sintered carbon. We have a problem of valving Propylnitrate and have found that "O" rings or seals manufactured from rubber will not do the job satisfactorily. Can you give us the name of a concern that manufactures the carbon seals.

RICHARD TYLER
Van Cleef & Company
Branford, Conn.

Sealing Propylnitrate is somewhat out of the oil hydraulic field. For the answer to your question we asked the editors of PRECISION METAL MOLDING Magazine who say that you should write to Mr. M. B. Peterson, National Carbide Die Co. Greenock Rd., McKeesport 2, Pa.

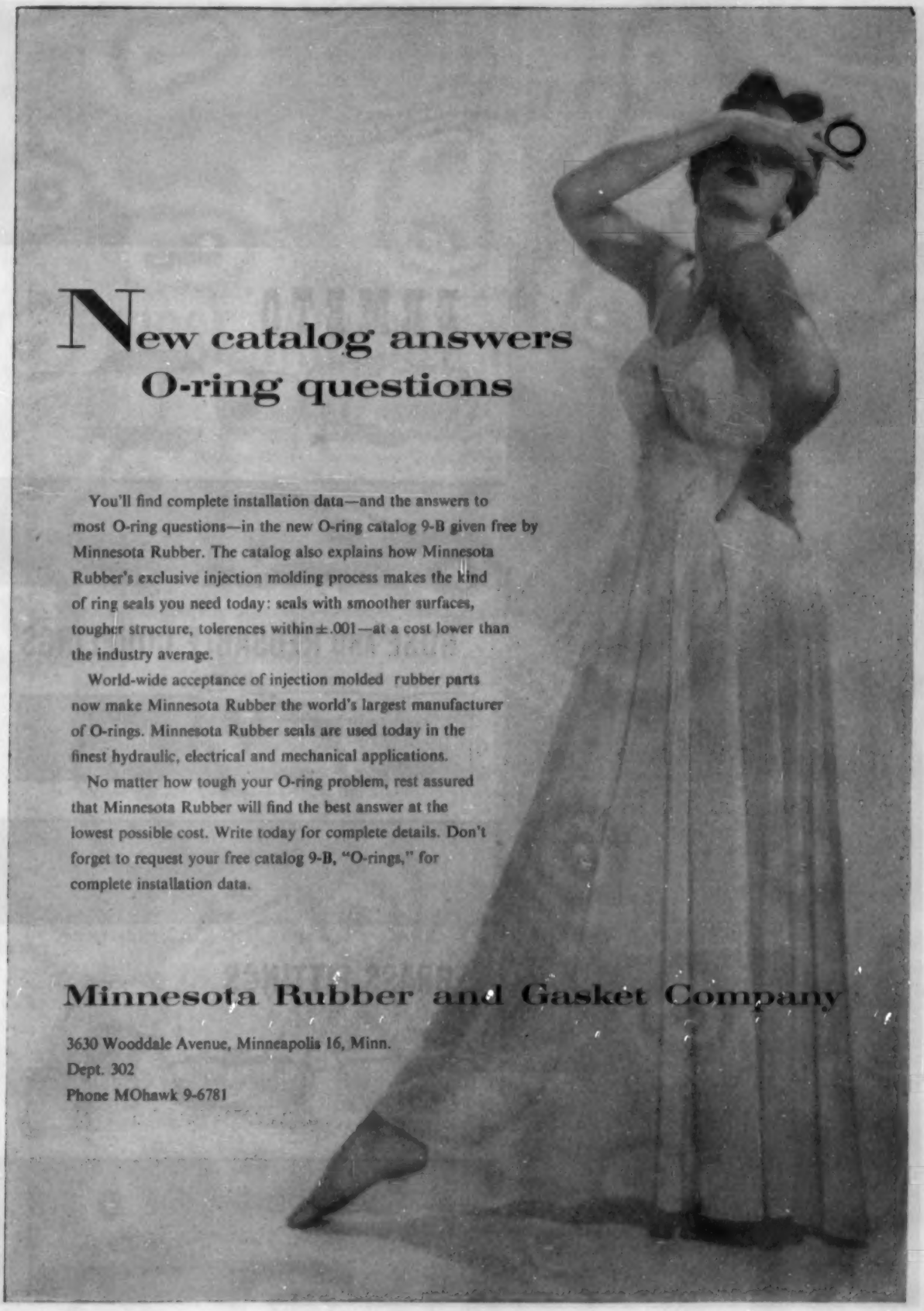
Can We Use Copper Tubing?

The Joint Industry Conference Hydraulic Standards, in the portion devoted to piping and fittings states: "Copper tubing or copper alloy fittings are not permissible with petroleum base fluids." We would like to know the reason underlying the above quote from the JIC Standards. We are contemplating the use of copper (¼, 3/6 and ½ in O.D.) with aluminum alloy fittings; hydraulic fluid MIL-0-6083A with working pressure in the range 0-450 psi; temperature range 75-95 F.

M. E. NIKONCHUK
Westinghouse Electric Corp.
Baltimore, Md.

Establishment of the JIC standards in 1948 was largely brought about by the efforts of the automotive industry. They have long been interested in working with their machine builders and component sup-

Continued on page 40



New catalog answers O-ring questions

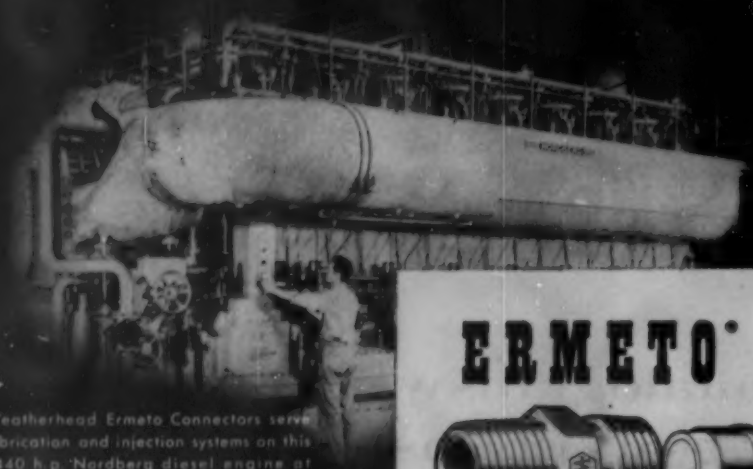
You'll find complete installation data—and the answers to most O-ring questions—in the new O-ring catalog 9-B given free by Minnesota Rubber. The catalog also explains how Minnesota Rubber's exclusive injection molding process makes the kind of ring seals you need today: seals with smoother surfaces, tougher structure, tolerences within ±.001—at a cost lower than the industry average.

World-wide acceptance of injection molded rubber parts now make Minnesota Rubber the world's largest manufacturer of O-rings. Minnesota Rubber seals are used today in the finest hydraulic, electrical and mechanical applications.

No matter how tough your O-ring problem, rest assured that Minnesota Rubber will find the best answer at the lowest possible cost. Write today for complete details. Don't forget to request your free catalog 9-B, "O-rings," for complete installation data.

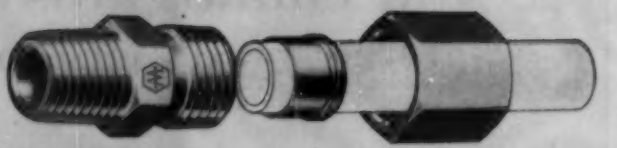
Minnesota Rubber and Gasket Company

3630 Wooddale Avenue, Minneapolis 16, Minn.
Dept. 302
Phone MOhawk 9-6781



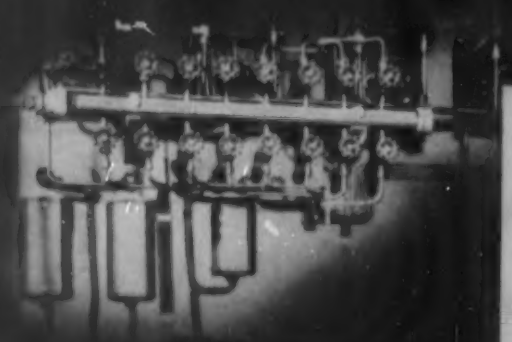
Weatherhead Ermeto Connectors serve lubrication and injection systems on this 3440 h.p. Nordberg diesel engine at working pressures up to 9000 psi.

ERMETO®



Weatherhead hose and coupling assemblies link this Van Norman grinder to its Vickers power unit. Replacements are readily made from stocks of bulk hose and matching couplings.

HOSE AND REUSABLE COUPLINGS



Weatherhead Brass Fittings connect air lines in the Cleveland Electric Illuminating Company's Lakeshore Steam Power Station, Cleveland, Ohio.

BRASS FITTINGS

Do You Get All This When You Buy Hydraulic Connectors:

- ☐ QUALITY MATERIALS AND MANUFACTURE?
- ☐ SIMPLIFIED ORDERING AND INVENTORY?
- ☐ PROGRESSIVE PRODUCT DESIGN?
- ☐ FIELD ENGINEERING SERVICE?

THOSE WHO BUY WEATHERHEAD DO!

There's proof of quality in the fact that Weatherhead serves the foremost names in American industry. To maintain these high standards, Weatherhead laboratories exercise rigid control over materials...Weatherhead production engineers stress painstaking care in manufacture . . . Weatherhead designers work constantly to improve our products.

Because Weatherhead lines are complete, you can order from a single dependable source, simplifying both purchasing and inventory. What's more, there's an experienced Weatherhead field engineer ready whenever you need him to help you take advantage of all that Weatherhead offers.

ERMETO® is the original flareless fitting. Made for high and low pressures, Ermeto gives you leakproof connections in 30 seconds. There's no flaring, threading, welding or soldering . . . the only tool you need is a wrench.

WEATHERHEAD HOSE AND REUSABLE COUPLINGS, carried in stock, let you make fast, easy, on-the-spot repairs to cut downtime. Common bench tools are all you need and couplings can be used over and over again.

WEATHERHEAD BRASS FITTINGS are machined from extruded stock. That means they're equal to forgings in strength. Large, flat wrench pads simplify installations.

Have You Saved with HOSELINKS?

If your products or processes call for standard hose assemblies in quantity, don't overlook the opportunity to save with Weatherhead HOSELINKS. These factory-made assemblies with permanently-attatached couplings are available on order in any quantity. Pressure-tested for leakproof service.

Want the Facts?

Weatherhead catalogs offer complete data on sizes, types, and application techniques . . . make valuable additions to engineering and purchasing files. Write today for Ermeto Catalog E-1457, Industrial Hose and Reusable Couplings Catalog H-1451, or Brass Fittings Catalog F-1456. The Weatherhead Company, Dept. A, 300 E. 131st St., Cleveland 8, O.

WEATHERHEAD DISTRIBUTORS CARRY COMPLETE STOCKS FOR FAST DELIVERY

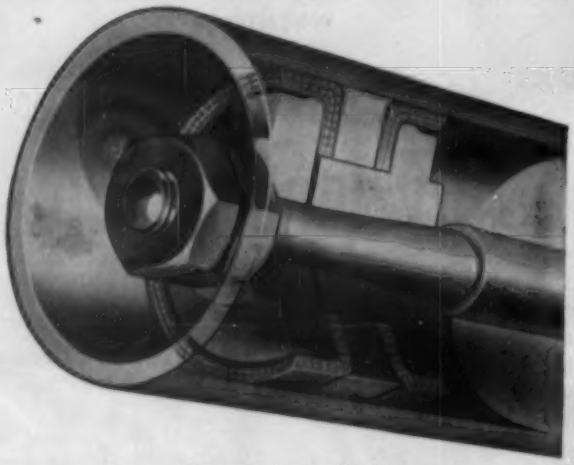
WEATHERHEAD

This trademark appears on every make of car, truck, bus, and tractor on equipment for machine tools, diesel and hydraulic applications on equipment for instrumentation, oil drilling, mining, road building for aircraft, railway, and marine engines for LP-Gas and anhydrous ammonia control equipment this symbol represents more than 1500 products made by Weatherhead . . .

YOU'RE AHEAD WHEN YOU SPECIFY WEATHERHEAD

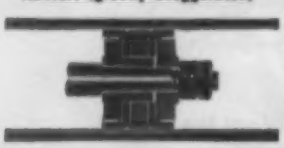
DARCOVA PUMCUPS

more efficient...job after job!

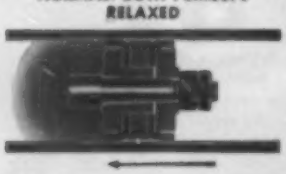


Phantom cutaway showing a typical Pumcup piston assembly.

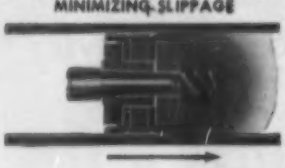
DIAGRAM OF DARCOVA PUMCUP ACTION (greatly exaggerated)



NORMAL: BOTH PUMCUPS RELAXED



UNDER PRESSURE: PUMCUPS SEAL AGAINST CYLINDER DESPITE WEAR, MINIMIZING SLIPPAGE



NO matter how tough your pumping problem Darcova Pumcups can help solve it . . . this has been proved in thousands of plants year after year.

Darcova Pumcup Advantages

1. Texture engineering that not only increases volumetric efficiency, but keeps it high with no appreciable fluid slippage for the entire life of the Pumcups.

2. Darcova Composition Pumcups give many times the life of other types of piston packing . . . *at least 3 to 1!*

3. Standard or special compositions are available for exceptional stability in handling almost *any* fluid . . . strong acids, alkalies, food products and even troublesome petroleum derivatives.

Send For Free Bulletin—Ask for Bulletin No. 4401 on Pumcups for reciprocating pumps; Bulletin No. 4502 on Pumcups for air and hydraulic mechanisms. Address . . .

DARLING VALVE & MANUFACTURING CO.

DARCOVA

THE ORIGINAL COMPOSITION CUP

PUMCUPS

Letters to the Editor

Continued

pliers to set up minimum standards for hydraulic, pneumatic and electrical sytems. It is the purpose of the standards to provide machine tools which will be easy to maintain and which will have a minimum of downtime due to component failures. Past experience shows that a system piped with copper tubing resulted in more leakage than a system piped with steel tubing. Under vibration copper has a tendency to work-harden and split. Consequently, its use for hydraulic tubing does not give as good results as steel tubing. That is the reasoning behind the JIC standards. Cost of downtime in the automotive industry is high and consequently, any design standard which will help reduce this downtime is important.

However, for equipment used in your own plant where your technicians and maintenance people are completely familiar with the design and construction, it may be quite feasible to use copper tubing to good advantage.

An Index for APPLIED HYDRAULICS

If you have them available, please send me the indices of articles appearing in APPLIED HYDRAULICS for the years 1950, 1951, 1952 and 1953.

D. L. SHANKS
Hanna Engineering Works
Chicago, Ill.

These indices have been forwarded to you. The 1951 index appeared in the January 1952 issue; the 1952 index appeared in the January 1953 issue; and the 1953 index appeared in the December 1953 issue.

Component Symbols in Australia

We would appreciate your opinion on the best method of familiarizing the Australian engineers with JIC symbols. We have your publication "Know your Component Symbols for Hydraulic Circuits" as reprinted from APPLIED HY-

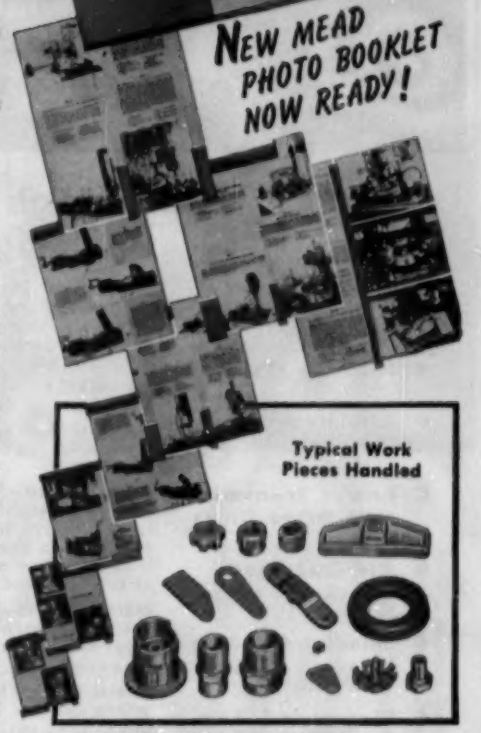
Continued on page 42

How to solve 39 PRODUCTION PROBLEMS with Mead Air Devices

SEE how to use standard Mead units to make automatic or semi-automatic machines!

New 16-page Mead PHOTO-BOOKLET presents actual examples in pictures and text of 39 different, tough production problems solved by various combinations of Mead Air Operated Devices. This interesting booklet shows how to:

(1) De-burr small parts fast **(2)** Press 3 components together **(3)** Tap die cast knobs **(4)** Insert rubber discs into metal cups for insecticide "bombs" **(5)** Swage hubs to hypodermic needles **(6)** Ream center hole in valve plate **(7)** Broach 2 internal slots in brass valve inserts, handling 4 sizes **(8)** Press filters into copper shells and indent dimple in shell **(9)** Tap 2 holes ⅛ in brass brush holders. **(10)** Drill and tap a 1/4–20 hole 9.16 deep then ream "bell-mouth" in stainless steel forging **(11)** Drill and ream a hole to controlled depth in brass valve body. **(12)** Drill No. 52 hole thru end of solid graphite pencil. **(13)** Press plastic liners into perfume bottle caps **(14)** Drill cast iron gas burners **(15)** Drill ¼ hole thru steel axle of fishing reel **(16)** Carry copper rods thru series of gas flames to braze special tips to lower ends. **(17)** Chamfer hole in spark-plug bodies approx. 3,600 per hour **(18)** Swage steel ball into brass nose of ballpoint pen approx. 3,600 per hour **(19)** Assemble patented brass couplings and flare neck into nut to simultaneously form fluid-tight seat **(20)** Drill twin holes in chain-saw teeth **(21)** Counter sink both sides small washers, wheels, rollers approx. 4,000 per hour. **(22)** Press shafts, bushings into plastic knobs **(23)** Drill and tap 5-40 threads in rectangular brass electric terminals, approx. 2,400 per hour **(24)** Crimp together 2 thin spring members of pen assembly **(25)** Press brass shells over cast iron cores of doorknob assemblies **(26)** Crimp saddles to plastic radio tube sockets **(27)** Stamp trademark on brass plugs approx. 3,600 to 4,000 per hour **(28)** Press ferrules on wood handles **(29)** Assemble paper hangers' tool roller to yoke by inserting pin thru collar **(30)** Feed, spin finials onto screw of lamp shade holder **(31)** Crimp eyelet and ring on pen barrel **(32)** Drill and tap 2 holes 8-32 in aluminum BX connectors **(33)** Drill ¼ hole in aluminum part, chamfer both top and bottom of hole, approx. 2,000 per hour **(34)** Cap cathode tubes for TV sets at 3,200 per hour **(35)** Fill pen tubes with ink, insert ball point assembly at one pass **(36)** Bend precut copper tubes 90° at 4,000 per hour **(37)** Drill 2 holes in brass castings, fed to 2-spindle drill head **(38)** Hold plastic bead, drill hole, eject **(39)** Drill bushing for 2 size clevis pins.



MEAD SPECIALTIES COMPANY, Dept. AH-54, 4114 No. Knox Ave., Chicago 41, Ill.

TEAR OUT MEMO COUPON FOR YOUR COPY . . .

Memo Coupon

MEAD SPECIALTIES CO.
4114 N. Knox Ave., Dept. AH-54, Chicago 41, Ill.

Send new MEAD PHOTO BOOKLET "Air Power At Work" specially printed in green and black.

Name_____

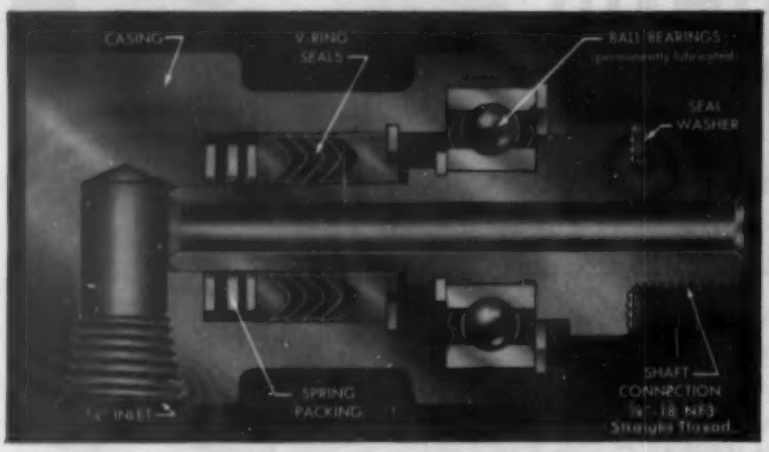
Company_____

Address_____

City_____ Zone____ State____

BARCO

A New ¼" REVOLVING JOINT



For High Speed, Rotating Piping Connections

Typical Applications

- Machine Tools
- Air, Hydraulic Clutches
- Power Transmission Drive Units
- Air Operated Chucks
- Spindles, Grinding Wheels
- Water and Air Brakes

■ This new Barco TYPE NV Revolving Joint is designed for use wherever you need high speed, *low torque*, leakproof rotary connections for air, hydraulic, or coolant lines on machine tools and other equipment.

NO LUBRICATION NEEDED—Sealed ball bearings are lubricated for life.

LEAKPROOF—Barco's V-ring seals have been proven in use for many years. Self-adjusting for wear.

CLOSE FITTING—¼" I. D. rotating shaft has ⅛" 18 NF3 straight threaded end which insures concentricity. Seal is made against the square shoulder on the rotating shaft drawn tightly, with a sealing washer, against the square face of rotating part.

PRECISION-BUILT—All parts machined to close tolerances. Bronze casing; hardened and ground steel shaft. Parts interchangeable and easily renewable.

SMALL, COMPACT, ECONOMICAL—Easy to install where space is limited. Overall length, 3⅛".

WIDE SPEED RANGE—Up to 2500 RPM. For pressures to 300 psi (air) or 1500 psi (hydraulic). Temperatures to 180° F. *Send for complete information.* BARCO MANUFACTURING CO., 532F Hough St., Barrington, Illinois.

ASK FOR BULLETIN No. 307

Letters to the Editor

Continued

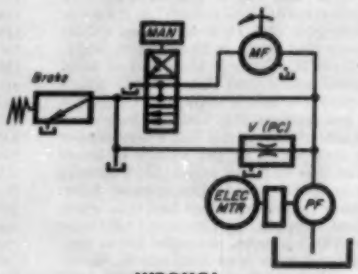
DRAULICS and consider this a very excellent publication up to a point of explaining the various valves, but feel that you may have some supplement we could add to this to enlarge on the symbols as designed by JIC.

E. S. ARCHER
C. S. Archer Pty. Ltd.
Stanmore, N.S.W. Australia

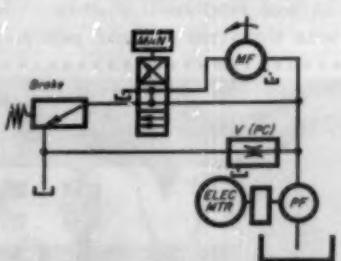
Our publication "Know Your Component Symbols for Hydraulic Circuits" is now out of print, but we have reprinted the 32-page "Fluid Power Circuits" from our January 1954 issue. This booklet is available at $.50 per copy for 1-49 copies, $.40 per copy for 50-99 copies and $.35 per copy for 100 or more copies.

Circuit Won't Work

In reviewing the brake circuit for rotary fluid motors on page 31 of the Fluid Power Circuit Section of January's APPLIED HYDRAULICS, I believe that the circuit should be made as shown in the attached sketch rather than as indicated in your circuit.



WRONG!



RIGHT!

I believe that you have your line open to tank at a time which would

Continued on page 47

"Who builds your 'CUSTOM' cylinders?"

"HANNIFIN DOES ... AND THEY DESIGN THEM, TOO!"

Yes, Hannifin designs and builds custom cylinders to the exact—and often extraordinary—specifications of manufacturers in many fields. (See chart at right for typical examples.)

Experienced buyers know that custom cylinders offer these distinct advantages. One, custom cylinders will exactly fit a given space or perfectly mate with another part. Two, custom cylinders may be designed for special operating conditions. Third, custom cylinders, when used in quantity, frequently cost less money.

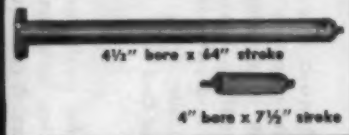
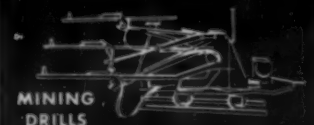
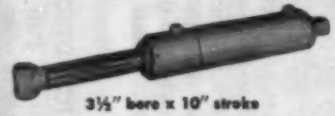
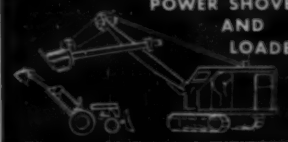
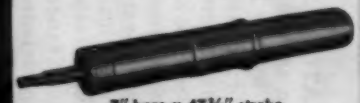
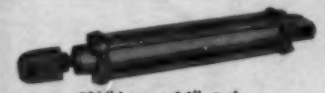
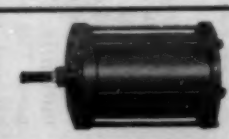
Why not have your design engineers consult with Hannifin. The Hannifin line of standard hydraulic cylinders is the most complete in the industry. Hannifin, with its broad experience, has the knowledge either to recommend the correct standard cylinder for your machines, or to design and build a quality custom cylinder at lowest possible cost.

See your Hannifin Sales Engineer ...or write for information—

HANNIFIN

Hannifin Corporation, 1155 S. Kilbourn Ave., Chicago 24, Ill.

Air and Hydraulic Cylinders • Hydraulic Power Units
Pneumatic and Hydraulic Presses • Air Control Valves

TYPICAL PRODUCTS	TYPICAL CYLINDERS	TYPICAL USES
LIFT TRUCKS	 4½" bore x 64" stroke; 4" bore x 7½" stroke	On lift trucks, hydraulic cylinders hoist and tilt the load, actuate special grabs and other attachments.
BULLDOZERS	5" bore x 24" stroke	On bulldozers and other blade-type equipment, hydraulic cylinders are used to lift, lower and position the blade.
MINING DRILLS 	 3½" bore x 10" stroke	On mining drills, hydraulic cylinders position the drill arms, level the unit, hold the machine steady while drilling.
LATHES	6½" bore x 10" stroke	On lathes, pneumatic or hydraulic cylinders advance tail stock on automatics, bring entire head assembly into position on turrets.
POWER SHOVELS AND LOADERS 	 7" bore x 47¾" stroke	On power shovels and loaders, hydraulic cylinders perform such important functions as digging, leveling, lifting, steering and turning.
FARM MACHINERY	 2½" bore x 14" stroke	On farm machinery, hydraulic cylinders actuate swing, grab, lift and steering mechanisms, position plow and harrow blades.
VALVES	 8" bore x 18¾" stroke	On large valves, pneumatic or hydraulic cylinders provide automatic operation, are much used where electric operation might be hazardous.

USEFUL LITERATURE

You'll find many valuable production and design ideas in publications described here . . . copies will be sent you free without obligation

HYDRAULIC ACCUMULATORS . . . ranging in bore sizes 1½, 4 and 7 in are presented in a new catalog 1536 A released by The Parker Appliance Co. The file consists of a catalog sheet for each series accumulator and the information presented is the same for all series. The accumulator furnishes hydraulic power at extremely high oil flow for relatively short cycles of operation intermittently. The unit can thus serve many different uses. The maximum operating pressure is 3000 psi and operating temperature range is –40 to 200 F. Much additional data is included as to construction and installation. A sketch shows the actual dimensions of the unit.

Circle 176 on Reader Service Card

OIL-TIGHT PUSH BUTTONS . . . selector switches and accessories, wherever oil and liquid are present. Oil tight construction seals out foreign material to make the units suitable for a variety of applications. They are widely used wherever the operator's hands or gloves are oily and dirty. Booklet GEA-5779 B available from General Electric Company, explains how this equipment operates. Included are cross-section drawings, full color application photos, dimensional outline diagrams and catalog listings.

Circle 177 on Reader Service Card

¾ IN. NEEDLE VALVE . . . that holds adjustment is described in preliminary literature released by Fluid Controls, Inc. An outline drawing is included which shows the exterior dimensions. A capacity chart is available which plots flow (gpm) vs pressure (psi) for ¼ turn, 1 turn and full open.

Circle 178 on Reader Service Card

VALVES AND SWITCHES . . . An attractive 20 page catalog No. 36 has been released by Barksdale Valves describing their line of valves and switches. A few of the valves cataloged are manual 4 way selector valves, for 1500 psi oil service; manual, 4 way selector valves for 3000 psi oil and water service; and for air service and pressures of 2000 psi; manual, shut off valves for 1500 psi oil service. Many solenoid operated valves are included and also the company's line of pressure switches. The book is in color and filled with much helpful information. Flow patterns, operating characteristics and cross-section views add to the value of the catalog.

Circle 179 on Reader Service Card

QUICK DISCONNECT . . . for push and pull controls. Pull and twist motions lock the connector in open or closed positions. A cross section view shows the construction and the parts making up the assembly. Literature is available from Hydraulic Products Co. Adaptable for rod or cable. Many other features are outlined and applications for the product suggested.

Circle 180 on Reader Service Card

AIR CYLINDERS . . . A 12 page catalog containing complete engineering data regarding five different models of automotive air cylinders and each of eight different sizes, has just been released by Petch Manufacturing Co. Sizes range from 1½ to 6 in bore. The cylinders have been designed for heavy duty work in automation, dies, die automation, for conveyor, foundry, welding equipment and other automatic machinery. A cross sectional view illustrates the construction and indicates the parts and features of the cylinders.

Circle 181 on Reader Service Card

ENGINEERING SERVICE . . . for the development of oil hydraulic products from conception of the idea to finished shop details is explained in a folder "Oil Hydraulic Design, Development, Test Surveys, Consultation" released by the Commonwealth Engineering Company. The services offered include developing new products and new processes, assisting engineering departments in solving special problems, making technical audits for manufacturers and conducting co-operative research for manufacturers, trade associations and technical societies.

Circle 182 on Reader Service Card

For more Reviews of Free Literature turn to page 126

Circle 43 on Reader Service Card ⟶

Harnessing hydraulic power with

Eastman
HYDRAULIC HOSE ASSEMBLIES

Harnessing hydraulic power has been the specialty of Eastman engineers for over twenty years.

Delivering maximum power to the point of action—without the former transmission loss through other mechanical methods—has improved the mobility and efficiency of modern machinery and equipment in every field.

The amazingly compact power unit on the Sherman Power Digger below is a dramatic example of the space saving efficiency and economy of modern hydraulic engineering.

Eastman, *First in the Field* of Hydraulic Hose Assemblies, is proud to have its equipment used on the four prominent products presented below.

If you wish to obtain the fullest benefits of modern hydraulic power application and improve your competitive position in your field—the door to the *Eastman Engineering Department* is always open!

SAFEGUARDING INDUSTRY'S *Lifelines of Mobile Power*

Eastman MANUFACTURING COMPANY, Dept. AH5, MANITOWOC, WISCONSIN

first in the field

write for our Catalog No. 101 on Eastman Hydraulic Hose Assemblies.

EASTMAN HYDRAULIC HOSE ASSEMBLIES AT WORK...

FARMHAND FRONT LOADER
Made by the Farmhand Co., makers of tractor end loaders, equipped with Eastman Hydraulic Hose Assemblies.

FOUR WHEEL DRIVE TRUCK
Made by the Four Wheel Drive Auto Co., "Power-Steering" through Eastman Hydraulic Hose Assemblies.

LEACH PACKMASTER
Manufactured by The Elgin Corporation. The packing unit is powered by Eastman Hydraulic Hose Assemblies.

SHERMAN POWER DIGGER
Developed by Sherman Products, Inc., and the Wain Roy Corporation. Eastman equipped, as shown above.

You Still Have Time to Enter the

APPLIED HYDRAULICS PRIZE CONTEST

Papers received by July 1, 1954 will be eligible for the Cash Prizes.

Announcement of all prize and honorable mention winners will be made in the October National Conference on Industrial Hydraulics issue.

Awards

FIRST PRIZE	$500.00
SECOND PRIZE	$300.00
THIRD PRIZE	$200.00
Fourth, Fifth, Sixth & Seventh Prizes, ea.	$ 50.00

Good design ideas that proved practical and operating or maintenance practices that cut costs won a full share of the Cash Prizes in last year's Contest. Any phase of the successful application of hydraulic or pneumatic components or circuits to industrial plant or mobile equipment is acceptable.

Don't delay. Your entry has a good chance to win a Major Prize.

DO YOU...

Design or sell hydraulic or pneumatic components?

Use hydraulic or pneumatic circuits for automation of machine tools, production machines or equipment?

Lay out your own customers' circuits?

Build fluid power accessories for your own shop or re-sale?

"Trouble Shoot" on oil or air circuits?

Convert machines and equipment to automatic operation?

Operate or supervise a department in your plant?

Have the responsibility for supervising or performing maintenance?

Then <u>You</u> <u>Should</u> enter the Contest.

To enter the Prize Contest, simply send for the Entry Blank. The Rules of the Contest and Suggestions to Contestants will be sent promptly with the Entry Blank.

The closing date for the 1954 APPLIED HYDRAULICS PRIZE CONTEST is July 1

For Entry Blank write

APPLIED HYDRAULICS PRIZE CONTEST EDITOR

1240 ONTARIO STREET • CLEVELAND 13, OHIO

Letters to the Editor

Continued

preclude braking of the fluid motor. It is also questionable as to whether the fluid motor would operate at all since I do not believe you would get any pressure at that point.

W. R. RANNEY
Walter Norris Engineering Company
Chicago, Ill.

You're being kind when you say it's questionable whether the fluid motor will even operate. It won't. Your correction is the way the circuit should be drawn.

Hydraulic Fluid Oil Coolers

We have, in the past, read several articles in APPLIED HYDRAULICS pertaining to the selection of hydraulic coolers. We would greatly appreciate it if you could forward copies of these articles.

C. E. DRAKE
Patterson-Kelley Company, Inc.
East Stroudsburg, Pa.

The article, "How, When Where to Use Oil Coolers" which was published in September 1950 has been sent to you. The JIC Standards includes a section on heat exchangers.

Hydraulic Fuses

I would appreciate receiving information regarding valves which act as "fuses" to stop oil flow when the line past the valve breaks or fails. It seems to me such valves are used in hydraulic systems of aircraft. Probable principle of operation is that when line fails past the valve, excessive flow starts, causing large pressure drop; the combined action causing the valve to close, thus preventing loss of oil through the failure point.

Will you please let me have some information about a fuse which will handle oil flow at 5 to 10 spm and pressure from 100 to 1500 psi.

F. M. MAGYAR
S. M. Morris Machinery-Equipment
Youngstown, Ohio

Tearsheets of Harry Hedland's article "Hydraulic Fuses . . . What Are They? How Do They Work?" will provide you with information about these valves. We've also sent you names of manufacturers of this type of valve.

ALL COMERS!

HERE'S THE CHAMP

. . . YOU SUPPLY THE CHALLENGER

The difficult fluid, gas, or air transmission problem in your plant — We'll send you a Snap-Tite Hi-Flow quick connect disconnect coupling — double or single shut-off or straight-thru — any size 1/8" to 3" — Test it! In your Plant, under actual working conditions — You be the judge — If it doesn't do a better job than the coupling you're now using — Or solve your problem — Ship it back collect! Fair enough? — Write today on your letterhead, briefly outlining your problem — We'll ship immediately.

Snap-Tite INC.

201 S. Cherryton, Union City, Penna.

Circle 120 on Reader Service Card

NEW PRODUCTS

Components, tools and equipment designed to improve operation of fluid pwer systems are described here . . . for more information fill in and mail the post card bound in this issue.

GROOVE INSPECTION
. . . with dial indicator

Features: Snap ring gages are fast acting, light and easy to handle. Internal diameters hav-

ing close tolerance are easily and quickly inspected. Gages are self centering. Diameters are measured direct, gages are set directly to a master ring gage. A slight rocking motion in one direction quickly indicates the minimum reading of the diameter on the indicator. Gaging motion is transferred through a lever to the gage indicator. With the use of a dial indicator graduated to .0001 in, internal dimensions having very close tolerance can be precisely inspected.
Application: The indicator gages enable the inspection of internal snap ring grooves from .240 to 5.270 diameter with accuracy. They can also be used for checking out-of-round, inside diameters, deep holes, taper, inside spherical radii.

Reliant Industries, South Gate, California
Circle 226 on Reader Service Card

NEEDLE VALVE
. . . can be panel mounted

Designation: PM Series
Design: The loosened packing nut and first holding nut are easily removed and the threaded stem guide can then be slipped through the panel opening. The first packing nut is then replaced and adjusted in relation to the second packing nut, firmly mounting the valve in the panel; assembly is completed with the addition of the packing nut and valve handle.
Application: Valves are ma-

chined from extra heavy bar stock and are designed for a maximum working pressure of 10,000 psi for use on water, oil or gas. The valve stem is of 416 stainless steel, precision machined with fine pitch threads to permit close throttling. A special packing is used to produce a leak tight seal around the valve stem without binding.

Jas. P. Marsh Corp., Skokie, Illinois
Circle 227 on Reader Service Card

HYDRAULIC POWER UNITS
. . . to 5000 psi and 250 gpm

Designation: Denasco
Sizes: From low pressure to 5000 psi, from .4 gpm to 250 gpm, from ¼ hp to 125 hp input. Pressure intensifiers to 200,000 psi.
Design: A basic power unit design for industrial service which can be modified to provide a completely packaged power system.
Construction: Ample fabricated steel reservoirs suited to application in extreme conditions of dirt and humidity.
Features: Clean design suitable for powering hydraulic systems and also complex circuits under adverse operating conditions.

Ditsen Engineering & Sales Co., Oakland, Cal.
Circle 228 on Reader Service Card

SMALL HYDRAULIC PUMP
. . . for personal aircraft

Designation: Model RG-10430
Construction: Unusual unit compactness of electric motor, rotary gear pump, pump adapter and radio noise filter. The rotary gear pump is extremely small, but it has the same speed as the motor and displaces ½ gallon

per minute at 1000 psi. This element is a complete pumping component attached to the motor pump adapter. The fluid may be hydraulic oil or engine lub-

Continued on page 52

Filter Requirements In The

AUTOMATION Program

For Hydraulic And Other Low Pressure Liquid Circulating Systems

SUMP TYPE (Cutaway)

Before the change over to Automation becomes a reality, every consideration will be given to the operating efficiency of all equipment that will enter into this program.

Every piece of equipment will be called upon for its maximum productive effort for the longest period of time. Careful consideration will also be given to the selection of accessories and components of equipment to achieve these results to the greatest possible degree. The rapid growth and ever increasing applications of hydraulic principles to production equipment strongly indicates that the greatest actuating force in the Automation program will be hydraulic. Since the heart of any hydraulic system is the pump, the selection of a filter for its protection will demand top consideration.

To filter out the damaging particles that cause approximately 75% of all hydraulic troubles, calls for the installation of a filter that meets certain established standards, such as

BALANCE— The balance between active filtering area and sufficient storage capacity for filtered out particles is a "must." This balance provides an even flow of liquid at a constant, steady rate of speed produced by the pump and brings about the desired effect of a gentle evenly distributed accumulation of filtered out particles against the entire filtering surface with a minimum restriction of flow. Thus, longer periods of productive operation are attained at absolute minimum of filter maintenance "down time." If this important balance is lacking due to efforts to cram too much filtering mesh for the sake of total rather than active area, filter soon becomes clogged causing pressure build-up, turbulent flow and require frequent maintenance or replacement.

CONSTRUCTION—Designed so that when filter requires service or cleaning, it can be done by any workman as easily and quickly as possible without the necessity of carrying spare parts in stock or the purchase of an entire unit for replacement.

LINE TYPE (Cutaway)

MARVEL SYNCLINAL FILTERS

are installed as standard equipment by over 400 Manufacturers of hydraulically actuated and other equipment utilizing low pressure liquid circulating systems, because—MARVELS are designed to give this all-important balance between minimum active filtering area and sufficient storage space for filtered out particles—

MARVELS are constructed so they can easily be disassembled, cleaned and reassembled by any workman in a matter of minutes—

MARVELS are available for convenient installation either in sump or on line. Line type operates efficiently in any position and may be serviced without disturbing pipe connections—

MARVELS, both sump and line types, are available in individual capacities from 5 to 100 G.P.M. and choice of mesh sizes ranging from coarse 30 to very fine 200.

MARVELS deliver a filter to meet your specific sizes and requirements AND DELIVER WHEN YOU WANT IT!

DEPEND ON MARVEL SYNCLINAL FILTERS FOR THE PROTECTION OF YOUR HYDRAULIC AND OTHER LOW PRESSURE SYSTEMS

Complete data may be obtained from manufacturer without cost or obligation. Write for Catalog #106 for Oil Filters or Catalog #300 for Water Filters.

MARVEL ENGINEERING CO., 625 W. Jackson Blvd. Chicago 6, Ill.

Dirty Hydraulic Systems cleaned in 50 hours or less by SUNVIS H.D. 700 OILS

No Loss of Production

Sunvis H.D. 700 Oils

- remove sludge and gums without affecting packings
- pick up contaminants and carry them to the filter
- prevent rusting of clean parts
- are available in viscosities to suit all hydraulic pumps

Learn more about the advantages of cleaning dirty hydraulic systems with Sunvis H.D. 700 Oils. Call your local Sun Office or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. AH-5.

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SUN OIL COMPANY

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PHILADELPHIA 3, PA. • SUN OIL COMPANY LTD., TORONTO & MONTREAL

Serving Modern Industry

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Regd Trade Mark

Infinitely VARIABLE SPEED HYDRAULIC TRANSMISSION GEARS

Aluminium Sheathing Plant

Aluminium Sheathed Cable, pioneered and developed by Johnson & Phillips Ltd. in their Plant in Britain, requires, for its cheapness, lightness and easy installation, a special manufacturing technique. Owing to the difficulty of extrusion, oversize aluminium tube is drawn down on to the cable through a die by a large diameter Hauling Gear. For this process, as for many others in modern industry, accurate speed control and high torque at low speeds are essential. 'VSG' Drives have been selected to meet these requirements.

Are you aware of the full possibilities of 'VSG' Hydraulic Power Transmission? Write to us today and we will mail you further details.

VICKERS-ARMSTRONGS LTD

VICKERS HOUSE · BROADWAY · LONDON · SW1 · ENGLAND *Cables* VICASTRONG LONDON

DI8a

Thermostatic control valve, shown under test by TWA technician, controls oil supply to oil cooler. Greer's Oil Radiator Temperature Control Valve Test Stand checks its performance and dependability under low, normal and high temperatures. Same machine also tests controls that operate cowl flaps of reciprocating engines.

Oil cooler being cleaned and tested by Aer Lingus maintenance men. This Greer Oil Cooler Stand sends cleaning fluid through cooler at the rate of two flow reversals per minute. Its tumbling and surging actions insure complete and positive cleaning. A compressed air circuit tests for cooler leaks after cleaning.

IN KANSAS AS IN IRELAND . . .

Greer Units Test Oil Cooling System

Greer precision test equipment has been proved throughout the world to give identical results regardless of place, conditions, or operator.

The standard Greer machines above do a complete test job on aircraft oil cooling systems. They work as a team to check the performance and dependability of the thermostatic control valve and the oil cooler under simulated flight.

Greer has pioneered in the standardization of test stands. Now, most machines can be ordered directly out of a catalog. Call or write for your copy. Greer also designs and builds to meet your exact test and maintenance requirements.

GREER
TEST EQUIPMENT

GREER HYDRAULICS INC., 454 EIGHTEENTH STREET, BROOKLYN 15, NEW YORK
Field Offices in Chicago, Dayton and Detroit • Representatives in principal cities in U. S. and abroad

New Products

Continued

ricating oil. A self adjusting seal assembly is installed in the adapter which contains drain port and vent.

Specifications: Motor is .44 hp and explosion proof. The filter limits interference from .15 to 150 megacycles per MIL-I-6181. The motor is rated for intermittent duty of 3 minutes on, 20 minutes off when pump is operating at 1000 psi discharge pressure. On personal aircraft it operates at 500 psi with aircraft engine oil to actuate the propeller pitch.

Lear, Inc.
Lear-Romec Division,
Elyria, Ohio

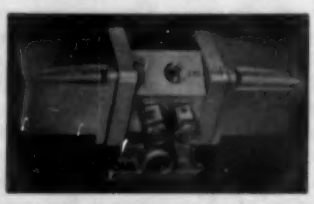
Circle 229 on Reader Service Card

AIR AND HYDRAULIC VALVES . . . eliminate solenoid adjustment

Designation: Hi-Cyclic

Sizes: ¼, ⅜, and ½ in NPT ports for air and ⅜ in NPT ports for hydraulic medium. Sizes up to and including 1 in will be available.

Construction: There is no metal-to-metal contact between the solenoid and valve piston. Nylon end thrust bushings, nylon actuating pins and bumper mountings prevent any shock being transmitted to the valve body. All electrical leads are



channeled from one, ½ in conduit located at the base of the valve. Both the valve base and solenoid housings are aluminum castings. Valves can be mounted in any position.

Features: Single and double solenoid air and hydraulic valves. Nylon end thrust bushings for positive valve piston location; elimination of solenoid adjust-

Continued on page 54

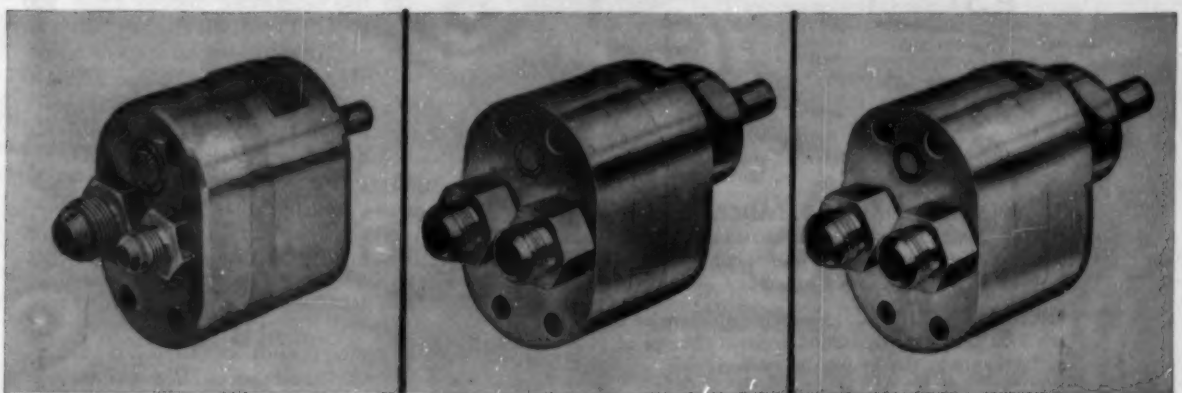
specify with confidence...

HYDRAULIC PUMPS FLUID MOTORS

Design engineers have confidence when they specify dependable Eastern Hydraulic Pumps and Fluid Motors. Exclusive Eastern features create an economical, reliable, and compact unit for the heart of your hydraulic mechanism.

Lightweight construction of aluminum alloy housing, nitralloy gears and shaft, and close tolerances assure longer service, higher volumetric efficiency, and more dependable operation. Various types of mountings are available for space saving installation.

In many cases by specifying an Eastern unit you realize dollar savings as well as great savings in size. They cut operating costs by keeping space requirements and weight to a minimum.



100 Series — Heavy duty gear pump. Delivery from .1 to 5 gpm and working pressures up to 1,500

700 Series — High pressure gear pump. Delivery from .6 to 9.6 gpm and pressures up to 1,500 psi.

2700 Series — Gear type fluid motor. Torque output — 0 to 15 ft. pounds.

Send for Eastern Hydraulic Catalog F-800. Contains valuable engineering diagrams and information.

Eastern INDUSTRIES, INC.

296 ELM ST., NEW HAVEN, CONN.

Announcing the New
PF-100 Series
DUDCO
DUAL-VANE
HYDRAULIC PUMP

A High Pressure Pump at a Low Pressure Price!

- COMPLETE HYDRAULIC BALANCE . . . the exclusive DUAL-VANE Design provides and assures complete balance of all hydraulic pressure loads. You get continuous, maintenance-free operation with increased efficiency at all pressures.
- INCREASED OUTPUT . . . machine efficiencies can be increased by 2000 psi pump operation without change of other standard components in the hydraulic system.
- CARTRIDGE CONSTRUCTION . . . all pumping parts that move are contained within an easy-to-install cartridge. Pump output can be altered by changing cartridge; servicing is simplified and machine down-time reduced.
- ECONOMY . . . the low initial cost and the 2000 psi premium performance of DUDCO PF-100 Pumps can double the value of your *hydraulic dollar.*

Write for DUDCO Bulletin No. DP-302. You'll get the facts on the new PF-100 Series Pumps.

DUDCO DIVISION
THE NEW YORK AIR BRAKE COMPANY
1704 EAST NINE MILE ROAD • HAZEL PARK • MICH.

New Products

Continued

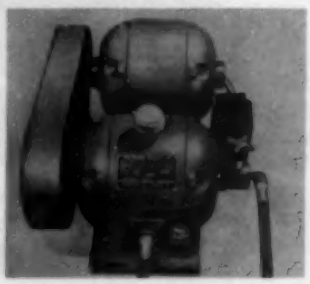
ment; dust and moisture-proof solenoid enclosure, quick disconnect electrical connections which permit removal of the solenoid coil without disturbing the electrical circuit; valve port interchangeability.

The Beckett-Harcum Company, Wilmington, Ohio

Circle 230 on Reader Service Card

HYDRAULIC PUMP PACKAGE . . . for pressures to 8800 psi

Designation: Series H Hi-Thrust
Operation: The pump is a six piston wobble-plate type with operation in either direction. It



has operating speeds from 900 to 2200 rpm, displacing 57 cu in per revolution. Units are available with 2, 3, or 5 hp, 220/440 volt, 3 phase, 60 cycle motors.
Specifications: It is capable of delivering 2.04 gpm at 8800 psi in intermittent operation. Higher outputs can also be obtained at lower pressures up to 4.5 gpm at 6200 psi.

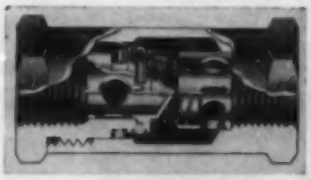
Manco Mfg. Co., Bradley, Illinois

Circle 231 on Reader Service Card

CHECK VALVE OPERATORS . . . with low pressure drop

Size: Up to 2 inches
Design: The principle used is applied in both check valves and access flow valves. The latter are designed to allow flow in either direction but will shut off all surge flow.
Applications: Valves provide safe operation of systems such as oxygen/propane or oxygen-acetylene, providing unintentional mixing of the two gases

in supply hoses. Safety is also assured in the operation of air actuated devices in the event of failure or reduction of air or vacuum supply. In the refinery and



chemical processing industries, valves find use in many circuits where two systems are cross connected, preventing escape of high pressure fluids into low pressure lines. Their zero leakage prevents the mixture of materials in the lines and their operation controls or prevents reversal of flow.

James-Pond-Clark,
Pasadena 8, California

Circle 232 on Reader Service Card

IMPREGNATED LEATHER
. . . resilient and tough

Designation: Vim No. 1243-311
Feature: E. F. Houghton & Co. is now marketing a new cup packing made from impregnated leather. The outstanding feature of these packings, is that they are fully impregnated with "Thiokol" Liquid Polymer and thus combine the resilience of rubber with the toughness of leather. Superior packing performance in oil and pneumatic applications result from the use of this combination. The synthetic elastomer referred to is a solventless liquid that converts to a rubber at room temperature without shrinkage. It is a liquid, it can be used to impregnate thoroughly all the pores of the mineral tanned leather used in the packings.
Specifications: The packings perform well under pressures of 0 to 5,000 psi, temperatures of —65 to 200 F and provide tight seals against oils, solvents and gases.

Thiokol Chemical Corp.,
Trenton, New Jersey

Circle 233 on Reader Service Card

For more NEW PRODUCT reviews turn to page 113

It's No Coincidence That
TowmoTorque Control
is Oil Powered by
HYDRECO

The famous HYDRECO Four-Bolt design gear-type Pump for 1000 to 1500 psi applications is the heart of the Towmotor hoist circuit.

A compact HYDRECO cylinder designed with low-friction characteristics actuates the TowmoTorque drive.

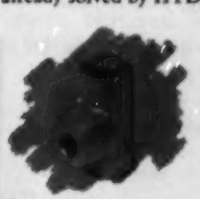
Write

Write for the latest HYDRECO bulletins on Pumps, Motors, Valves and Cylinders.

Advanced engineering ideas, like the Towmotor TowmoTorque drive, have joined forces with HYDRECO Oil Power too consistently to be a coincidence.

Of interest to design engineers is the hydraulics problem successfully solved here. The control of the torque converter drive through a specially-designed HYDRECO valve enables the operator to control vehicle speed independently of the hoisting speed. For example, the operator can drive the truck forward and backward very slowly while raising the load at maximum speed. Other HYDRECO components on this truck include a special cylinder and relief valve for the TowmoTorque, and a pump, control valve and cylinder for the hoist circuit.

HYDRECO Oil Power is providing a definite sales advantage to more and more makes and models of mobile equipment, machine tools and special machinery. And, frequently you'll find that the things you're dreaming up are problems already solved by HYDRECO engineers.

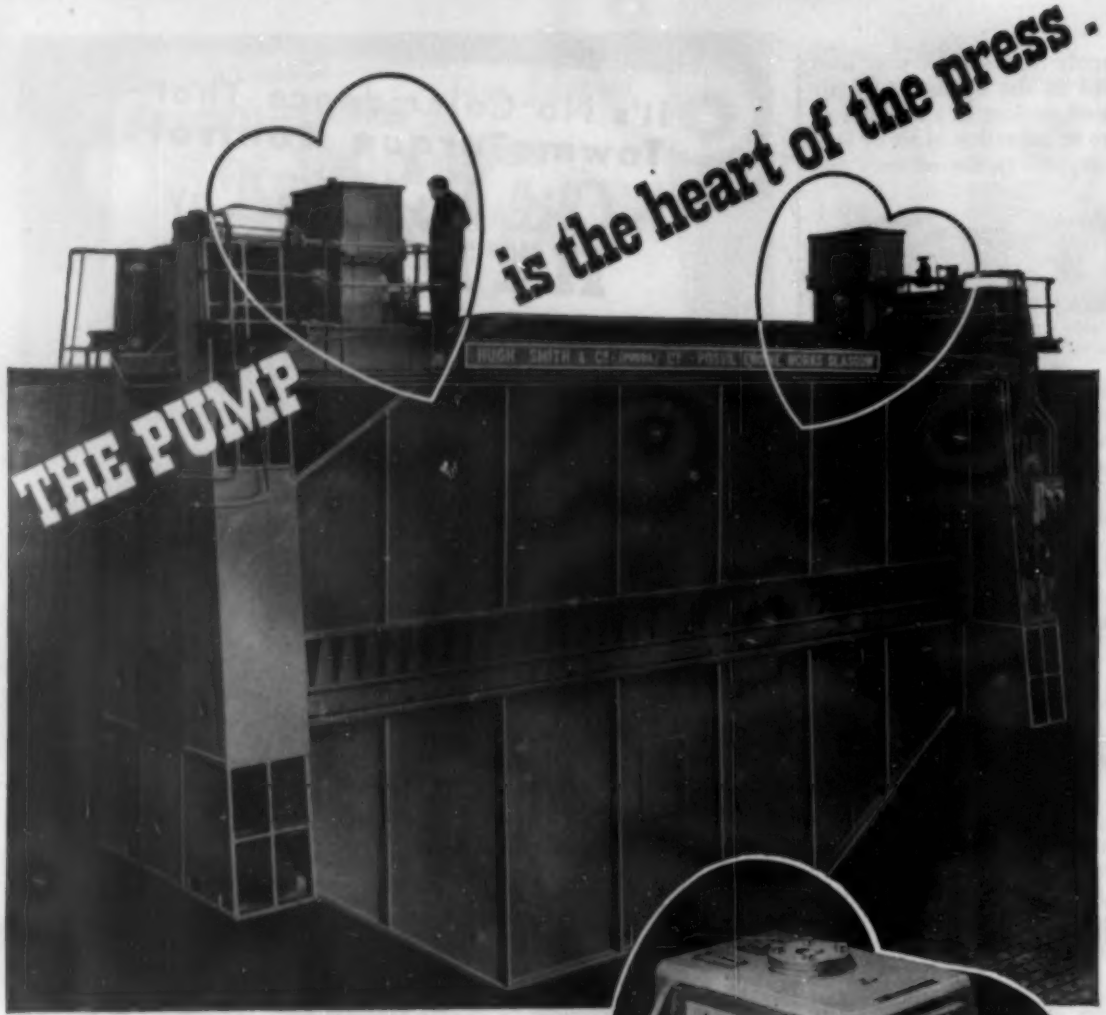


This HYDRECO relief valve is used on the torque converter to protect the heat exchanger from excess pressure.

Located beneath the floorboards is the HYDRECO-designed valve, one plunger of which is connected to a hand lever and hydraulically controls the forward and reverse motion of the truck. The other plunger, connected to a foot pedal, controls the vehicle speed regardless of engine speed.

HYDRECO DIVISION
THE NEW YORK AIR BRAKE COMPANY
1104 EAST 222nd STREET • CLEVELAND 17 • OHIO

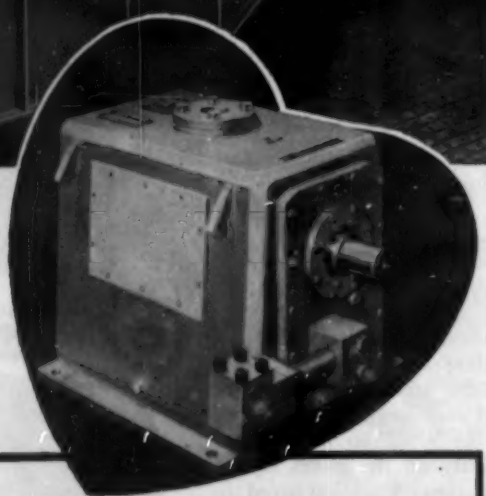
Circle 73 on Reader Service Card



A 1,200-ton self-contained press by Hugh Smith & Co. (Possil), Ltd., designed for the manufacture of corrugated bulkheads for ships, and is also applicable to general flanging work in lengths up to 40 ft.

This fine example of British press design incorporates "Electraulic" pumps and controls for :—

(*a*) Consistent and unfailing performance.
(*b*) Power output variable as required.
(*c*) Instantaneous response to finger tip control.
(*d*) Economy.
(*e*) Completely self-contained unit.



ELECTRAULIC
REGD. TRADE MARK
HIGH SPEED
HYDRAULIC PUMPS

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TIME IS MONEY IN DISCHARGING BULK CARGO

WHY NOT SEE WHAT A *Hydromotor* CAN DO FOR YOUR PRODUCT OR JOB?

16 Standard Models with ratings from 150 inch-pounds at 100 p.s.i. to 230,000 inch-pounds at 1,000 p.s.i. Additional special sizes with substantially higher ratings are in limited production.

These 60 Bonnot Hydromotors—of 50,000 inch-pounds torque capacity each—are part of 240 recently delivered to one customer.

On bulk carriers, they will replace cumbersome mechanical equipment in the operation of bottom gates on heavy materials hoppers. They'll affect *surprising money savings in unloading time*, and being completely sealed and self-contained they'll *minimize operating and maintenance expense* caused by heavy loads, dampness, dirt and corrosion . . .

Using any hydraulic medium, the Hydomotor provides reciprocating rotary power . . . develops instant full torque in either direction through any arc up to 280°. With all the flexibility inherent in hydraulics equipment, the Bonnot Hydomotor may be stopped at any point, reversed, speeded up or slowed down by simple controls.

For

LIFTING • LOWERING • PUSHING
PULLING • REVOLVING
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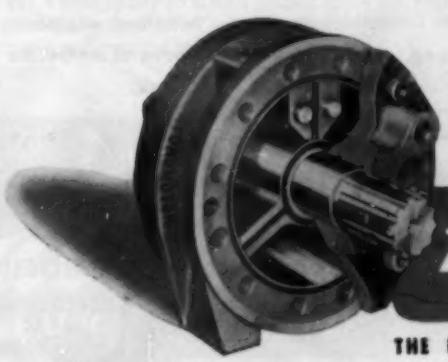
CLAMPING • TURNING
INDEXING • OSCILLATING
DUMPING • TUMBLING • MIXING
AGITATING • BREECH BLOCKING



For application and engineering data, write for Hydromotor Bulletin #21.

Name of Local Agent on Request

Hydromotor DIVISION

THE BONNOT COMPANY • CANTON 2, OHIO

The diaphragm in this valve that regulates the intake to a boiler feedwater storage tank, is in almost constant motion 24 hours a day at temperatures well above 100°F. Successive synthetic rubber diaphragms lasted 7, 11 and 13 months respectively. That's unsatisfactory performance in a power house supplying energy to a large chemical plant. So they tried a Silastic coated glass diaphragm. Recently inspected after more than 78 months of service, the Silastic diaphragm was still soft and flexible; showed little wear; appeared serviceable for many more months.

As a valve diaphragm at +100°F SILASTIC outlasts heat-stable organic rubber 7 to 1

For maximum life and reliability

specify SILASTIC

the durable silicone rubber

You, too, will find that Silastic will last longer and give you more reliable service in most applications where the life of organic rubbers is limited by high temperatures, oxidation or weathering. You will also find that Silastic can be used in many cases to take the place of complicated mechanical devices made necessary by the relative instability of organic rubber.

And Silastic is in a class by itself among rubbery materials. For example, we have aged typical samples of a Silastic stock for 12 months in an air circulating oven at 350°F. After such accelerated aging, those samples showed an increase in hardness of only 18 points from 46 to 64 durometer; elongation went down from 320 to 105%; tensile strength dropped only 26 points from 557 to 531 p.s.i.; and there were no significant changes in any of their dielectric properties.

And that is almost incredible performance at temperatures high enough to change any other kind of rubber to a brittle, noninsulating material in a few hours or days at the most. When you need rubbery properties or good dielectric properties in a resilient material that will withstand weathering or long exposure to temperatures above or below the limits of ordinary rubbers, specify Silastic.

Mail Coupon Today

Dow Corning Corporation, Dept. DK-17, Midland, Michigan

Please send me:

- ☐ List of Silastic Fabricators
- ☐ Silastic Facts 10c
- ☐ "What's A Silicone?"

Name_____ Title_____

Company_____

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FIRST IN SILICONES

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In England:
Midland Silicones Ltd., London
In France:
St. Gobain, Paris

a design engineer recently paid us this compliment while examining one of our cylinders. We pass it on to you with the idea that you too may find Pathon cylinders designed right for the job on your cylinder applications.

"It's designed right—just the way I'd do it myself."

As a designer...

YOU GET EVERYTHING YOU WANT IN A HYDRAULIC CYLINDER

Pathon

HYDRAULIC CYLINDERS

are made in eight standard models and can be adapted to practically any application. Write us today for Bulletin No. 22. We're glad to help you on any cylinder problem.

- COMPACTNESS
- LOW STRESS CONCENTRATION
- INCREASED STRENGTH ... AND FATIGUE LIFE

All Pathon Hydraulic Cylinders in Series RH 2000 P.S.I. and QH 1000 P.S.I. use a single screw head to attach the head to the body of the cylinder. This design provides an absolute minimum of physical size and at the same time reduces stress concentration throughout the barrel to the head attaching area. You get a *plus factor* in shock loading with increased strength and fatigue life. Your Pathon Hydraulic Cylinders are simple and sturdy in construction, require much less maintenance.

Pathon AIR CYLINDERS

DIRECTIONAL CONTROL VALVES

We also manufacture a complete line of Air Cylinders and Directional Control Valves. Write for information.

Pathon MANUFACTURING CO.

3523 PACIFIC AVE.
CINCINNATI 12, OHIO

We're quick on the draw, too!

(especially on seamless steel tubing)

Do you need seamless steel tubing drawn quickly—and accurately—to your individual specifications? Then it'll pay you to check with Summerill before you order. *We're geared for service.*

Our research, production and sales groups are small enough to give you the kind of personal service that follows a job through from start to finish . . . and big enough to get volume production rolling in a hurry on your special tubing problems.

Our modern plant is flexible, versatile and completely equipped to produce a broad range of cold drawn seamless steel tubing in the specific sizes and shapes you need. It's laboratory controlled through every step of production to guarantee top quality products.

Why not bring your seamless steel tubing problems to Summerill today? We'll welcome the opportunity to provide you with samples, technical literature and assistance—or to work with you right in your own plant. Address: Summerill Tubing Division, Columbia Steel & Shafting Company, Pittsburgh 30, Pa.

Summerill

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HYDRAULIC TUBING • SPECIAL TUBING • MECHANICAL TUBING • DIESEL TUBING • PRESSURE TUBING • AIRCRAFT TUBING

Designing for more customer satisfaction?

J-M Moulded Packing Cups, installed on air cylinder piston of Morgan Laundry press, provide tighter, more efficient seal and eliminate troublesome maintenance problems

When Morgan Laundry changed to J-M Moulded Packing Cups, they found

"Maintenance on packings practically eliminated . . ."

The Morgan Laundry, large supplier to hotels and institutions, encountered excessive down time for maintenance of their laundry presses. Packings supplied as original equipment on the air cylinder pistons of the presses needed frequent lubrication to prevent drying out. It was difficult to maintain proper cleanliness of the equipment.

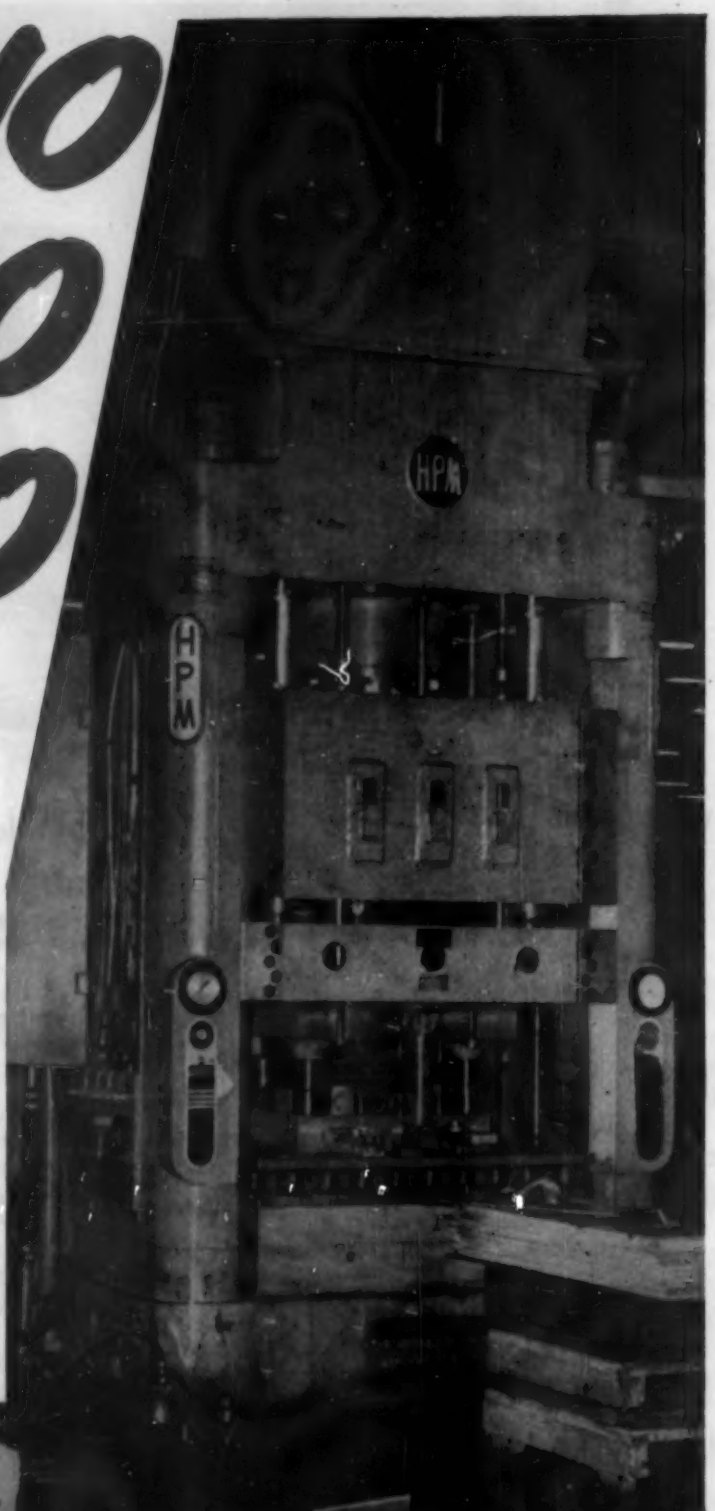
When the company replaced the conventional material with J-M Moulded Packing Cups, packing life was increased. These packings required practically no maintenance, and the danger of soiling laundry because of relubricating packings was completely eliminated.

Designers and manufacturers can offer their customers many advantages by providing J-M Moulded Packing Cups on original equipment. These custom-made materials may be used on practically all types of air- or hydraulic-operated cylinders. They help improve operating efficiency, and they make possible easier, cleaner maintenance. These factors are especially important in critical installations such as hospitals and hotels, as well as laundries and other service establishments.

J-M Moulded Packing Cups are available in a variety of compositions to meet a wide range of pressures, temperatures and service conditions. For more information on all types of Johns-Manville Moulded Packing Cups, write to Johns-Manville, Box 60, New York 16, N. Y. In Canada, 199 Bay Street, Toronto 1, Ontario.

Johns-Manville PACKINGS & GASKETS

SLUDGE? NO
RUST? NO
FOAM? NO



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VARIABLE SPEED HYDRAULIC TRANSMISSIONS

CONTROL of speed, torque and power over a large stepless range is available when driving the load with a rotary fluid motor. The combination of a pump and fluid motor is a variable speed hydraulic transmission. These two units may be mounted in a common casing and combined to form an integral transmission. Operating and design principles of these combined units are the same as those for individual pump and motor with connecting pipes replaced by short passages in the transmission.

What basic types of transmissions are available and what are their characteristics? It is possible to have four basic combinations.

Variable delivery pump and constant delivery motor

With a constant work load, varying the output speed will result in variable horsepower and almost constant output torque. Constant torque transmissions are used on conveyors, machine tool feeds and processing equipment.

Constant delivery pump and constant delivery motor

Since we consider variable speed control inherent in a transmission, a flow control valve must be used in the circuit to vary oil delivery to the motor. For a given load, torque will be constant while horsepower will vary with speed.

Constant delivery pump and variable delivery motor

At a given load or hydraulic pressure, horsepower is constant over the speed range and torque varies inversely with speed. The speed range is generally limited to a ratio of 3:1. The minimum speed is determined by the geometric capacity of the motor at full stroke setting, and the maximum speed at reduced motor stroke setting largely depends on design of bearings, inertia, friction etc. Examples of equipment requiring a constant horsepower drive are winders and machine tool spindle drives.

Variable delivery pump and variable delivery motor

For this combination any desired variation of torque and horsepower may be obtained with a very wide speed range. The upper speed range will be at constant power, and the lower speed range will be at constant torque.

This drive provides a wide range of speed with simple torque control.

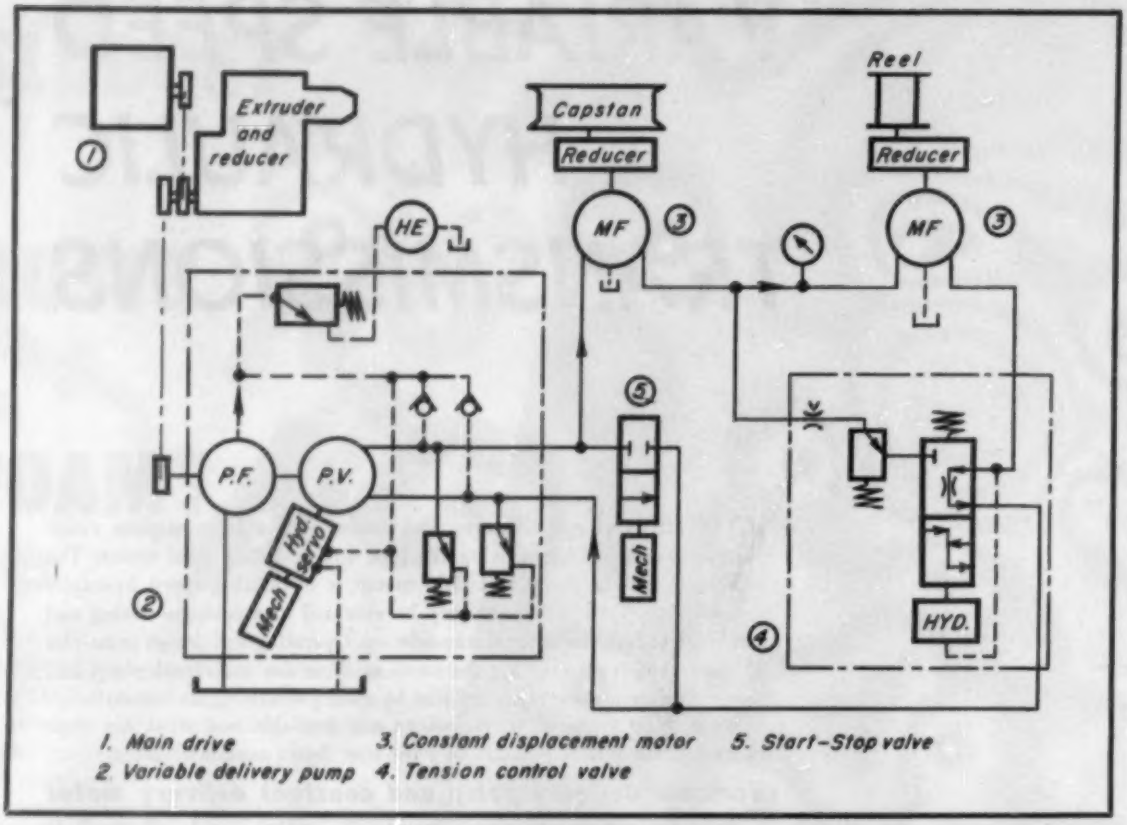

FIG. 1. This drive has two fixed displacement motors, connected in series, driven by a variable displacement pump.

Variable Speed for Wire Covering

By C. G. Ellis

APPLICATION of the hydraulic drive to a wire covering machine is typical of the general run of hydraulic variable speed drives in many industries. The wire covering machine application has been selected because it clearly illustrates the advantages of the hydraulic drive in providing exceptionally wide ranges of speed variation, simple and rugged control elements and the ease with which torque control is obtained and low maintenance cost.

The three main sections of a wire covering machine consists of the extruder, capstan and rewind sections. The extruder is shown in Figure 2 and consists essentially of a variable pitch screw which is driven by a built-in gear reducer at a relatively slow RPM. The input shaft of this reducer is driven by some type of main drive which, in the past, has ranged all the way from mechanical variable speed drives to hydraulic variable speed drives. In this particular case, a direct current electric motor drive is used. The speed range on this section of the machine very seldom exceeds more than a 7 to 1 variation.

Also driven from the main drive for the extruder is a variable displacement pump, as shown in the hydraulic circuit diagram, Figure 1. This pump provides the power to drive the capstan and reel in synchronism with the extruder. As the speed of the extruder is

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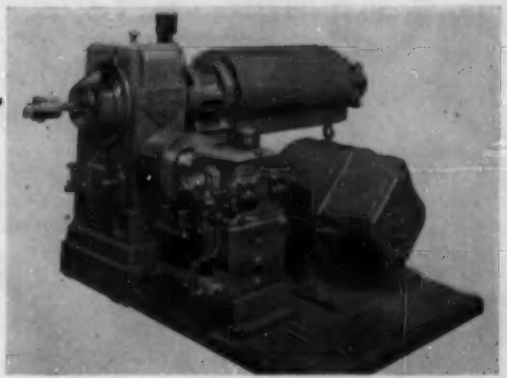
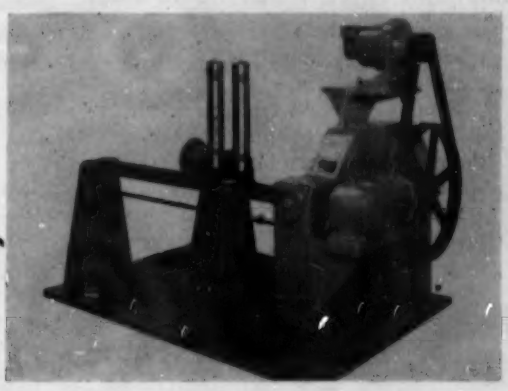


FIG. 2. EXTRUDER with 50 hp, DC motor main drive and variable volume pump mounted on the oil reservoir. A remote master and slave control is used to vary the pump delivery.

All photos courtesy John Royle & Sons

FIG. 3. CAPSTAN WHEEL is driven by a constant displacement hydraulic motor through a right angle gear reducer.

FIG. 4. CONSTANT TENSION rewind is driven by a constant displacement hydraulic motor through V-belts. A laying device, which distributes the wire over the surface of the reel, is driven from the rewind shaft through a mechanical variable speed drive.



Machine

increased or decreased, the volume of the variable displacement pump also increases or decreases thereby causing a corresponding change in speed of the capstan and rewind hydraulic motors.

Displacement per revolution of the variable displacement pump is changed by means of a hydraulic servo control which is a part of the standard equipment of the pump. The use of the servo control permits finger tip control of the pump and permits any type of light flexible control device to provide remote adjustment of the pump. In the past, light control linkages, flexible cables and hydraulic remote controls, such as the control seen in Figure 2, have been used. The adjustable displacement of the pump permits the ratio of the capstan and rewind speeds to be varied with respect to the extruder speed.

The ratio of adjustment of the capstan speed with respect to the extruder speed in some cases is as high as 10 to 1. This high ratio coupled with the variable input speed to the extruder means that the overall speed ratio of the capstan can be as high as 70 to 1.

The variable displacement pump incorporates a number of built in features including a gear pump which serves the dual purpose of providing low pressure for operation of the hydraulic servo control and supercharging volume to the return side of the variable displacement pump. The wide range of input speeds to the pump makes it necessary to supercharge

the suction side of the pump to prevent erratic operation. Since the gear pump is driven at the same input speed as the variable displacement piston pump, the gear pump volume is reduced whenever the extruder speed is reduced. In some cases, this has placed a limitation on the minimum speed at which the extruder can be operated because the gear pump must be driven fast enough to produce a sufficient volume of oil to provide make up oil for the slip oil lost in the high pressure part of the circuit. In those cases where this was a problem, the minimum speed has been obtained by providing a separate electric motor driven gear pump to provide the supercharge volume.

Capstan Speed Governs Coating

The output oil from the variable displacement pump is piped to the constant displacement hydraulic motor which drives through a reducer to the capstan. This is illustrated in Figure 3 and is identified as motor #3 in the schematic piping diagram. The speed of the capstan with respect to the speed of the extruder, governs the amount of plastic or rubber coating deposited around the wire. The maximum speed of the capstan is limited by the properties of the material being extruded. Located between the extruder and the capstan on those machines which coat the wire with plastic is a cooling trough utilizing water to cool the plastic before it reaches the capstan. In the case of rubber covered wire, the wire passes through a vulcanizing tube which vulcanizes the wire with steam before it reaches the capstan.

Figure 4 shows a typical rewind. The rewind consists of a reel or core on which the wire is wound with the reel being driven through a V-belt drive by a constant displacement hydraulic motor. Also included is a laying device which is driven from the rewind shaft through a mechanical variable speed drive device to distribute the wire over the surface of the reel. The speed of the laying device with respect to the speed of the reel is varied by the mechanical variable speed drive in accordance with the diameter of the wire.

Referring to Figure 1, it will be noted that the volume of oil delivered to the rewind motor is in approximate direct proportion to the speed of the capstan. This means that the reel speed is synchronized with the speed of the capstan by hydraulically connecting the motors in series. In actual practice, the reduction ratio between the constant displacement motor and the reel is such that the reel speed is 10 percent faster than that required to match the speed of the wire. This excess speed insures take-up of any slackness in the wire between the reel and capstan during start of a reel. As the wire is wound on the reel, the diameter increases, requiring a slower RPM and, therefore, an excess quantity of oil is delivered by the capstan motor to the reel motor. This excess volume of oil passes through the constant tension control valve #4 as shown in Figure 1.

The constant tension control valve consists of three elements:

1—A variable orifice
2—A variable relief valve
3—An automatic start valve

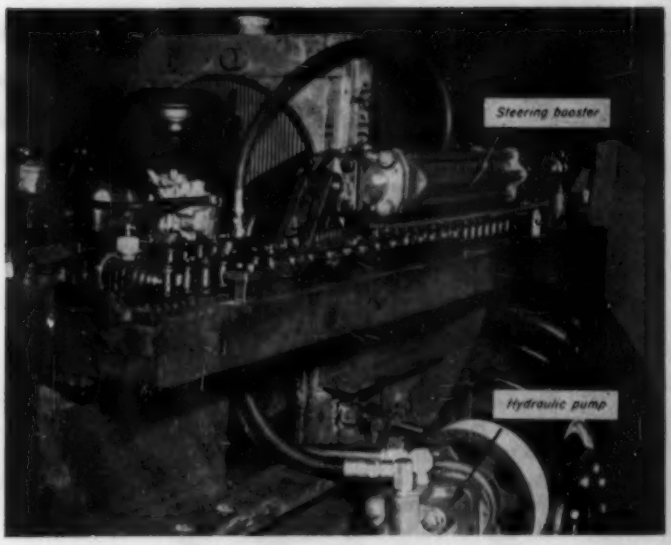
The function of the relief valve is to provide the desired pressure so that the correct initial torque can be applied to the reel to produce the desired wire tension. The function of the choke is to maintain this uniform tension by increasing the torque as the roll diameter changes. To increase the torque as the roll diameter changes, it is only necessary to increase the pressure in direct proportion to the change in roll diameter and in inverse proportion to the output speed of the reel motor. Over a range of approximately 3 to 1, the characteristics of a properly designed choke valve will be such as to produce these desired characteristics of lineal relationship between volume and pressure. As the rewind motor slows down due to the increase in diameter of the reel of wire, the excess volume of oil is passed through the choke valve in proportion to these changes in roll diameter.

The function of the automatic start valve, incorporated in the tension control valve, is to prevent bypassing of the oil through the choke and relief valve during the starting and initial acceleration of the reel. Without this valve on heavy reels of wire where light tension is involved, the acceleration of the reel with respect to the balance of the machine would be so slow as to interfere with proper winding. During this acceleration period, the choke and relief valve are blocked off until such time as there is a sufficient quantity of oil from the exhaust side of the rewind motor to shift the spool of the automatic start valve. After the valve spool has shifted, the flow of oil from the choke and relief valve join together with the exhaust oil from the rewind motor to return to the suction side of the variable displacement pump. On light reels of wire, this automatic start valve can be eliminated because increased accelerating torques are not required.

Also shown as item 5 in Figure 1, is a manually operated two-way valve which permits operating the extruder without operating the capstan or rewind reel. During this time, the volume from the pump is bypassed from the pressure side to the suction side of the pump. This permits the material to be extruded without wire being drawn through the extruder thereby permitting purging of the extruder without wasting wire.

An examination of the records on some of these applications shows that some of these drives have been in operation over ten years with no maintenance other than an occasional change of oil. This kind of maintenance record is difficult to beat with any other type of variable speed mechanism that covers this wide a range in speed.

The versatility and dependability of the hydraulic variable speed drive is being recognized by many more companies today. As increased automatic machinery and processes are developed, the hydraulic drive will find wider acceptance among all industries.



VIEW of the rear engine area on a fork truck showing the V-belt driven pump, steering booster and two of the steering roller chains. Four lengths of the smaller chain are in the steering control linkage, two lengths of the larger chain are in the steering drive mechanism.

CHAIN LINKAGES

for hydraulically powered machines

THIS FORK LIFT TRUCK is capable of lifting loads of 26,000 pounds up to 14 feet at a rate of 35 feet per minute. The truck lifts, tilts and steers hydraulically.

THE transmission of power through chain or flexible tension linkages is steadily growing in favor on hydraulic systems because of the efficient utilization in the inherent advantages of chain for this purpose. In many heavy duty applications the positive drive, without slippage, of power chain gives the highest efficiency of power transmission. The flexibility and ease of both application and maintenance of well designed and properly selected flexible tension linkages is an advantage that wins the favor of the most critical production and management personnel. When the maximum strength in a given size, width or thickness, is required, power chain is often the best answer. On equipment where shock is a problem, the ability of chain to absorb shock with less vibration (than gears, for example) may be a critically important factor in the operating life of a machine or piece of equipment. Finally, power chain is often the most economical answer to a power transmission problem.

A typical example of how the advantages of flexible tension linkages were applied to heavy duty equipment is the new Ross Carrier fork lift truck, designed for high speed loading and tiering of heavy units with maximum maneuverability. This unit, is the largest

Chain linkages transmit hydraulically developed forces without slippage and provide maximum strength for a positive flexible connection between moving machine members.

of its type ever built on pneumatic tires. The truck, with a lifting capacity of 26,000 pounds, effectively utilizes flexible tension linkages for lifting, tilting and steering.

A double gear pump, V-belt driven from the engine crankshaft sheave, supplies a maximum of 1000 psi to operate a lift cylinder, two tilt cylinders and the steering booster.

The hoist and tilt cylinder system comprises one of the two circuits. An 8 inch cylinder lifts the rated load at a rate of 35 feet per minute at full pressure. Two six inch cylinders tilt the tower members a maximum of 12 degrees backwards and 4 degrees forward. Tandem four-way control valves with two lever operators, one for the hoist and one for the tilt, is operated conveniently from the driver's seat. A 39 gallon reservoir serves both this and the steering circuit.

The hydraulic steering system includes a steering handwheel that actuates a double acting booster. The steering booster utilizes hydraulic pressure to develop steering thrust. This thrust is transmitted to the vertical steering shaft by a sliding plate, chain and sprocket installation. The steering hand wheel is coupled to an integrally-built control valve on the steering booster through a roller chain. When the steering hand wheel is turned in either direction, the valve slides, directing oil under pressure to the booster piston. Any steering hand wheel movement produces a corresponding movement of the chain. An overload relief valve, built into the booster, protects the steering system against excessive pressure.

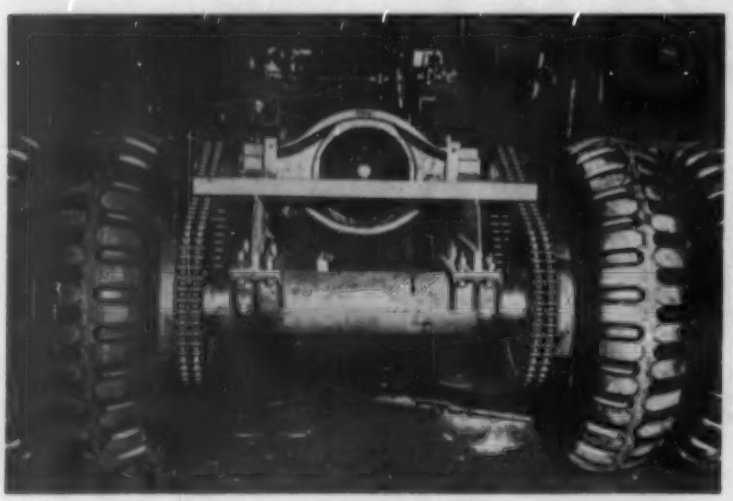
Two cable type chains provide compact, high strength flexible tension linkages for hoisting the forks. Cable type chains give maximum economy since plain sheaves, instead of the more expensive sprockets, can be used on each end of the hoisting cylinder piston rod yoke. The cable chains were assembled from roller chain pin link plates and pins in a 6 x 6 lacing, i.e., both male and female links have six link plates for a balanced design. This gives maximum strength in a relatively narrow width chain.

The cable chains are connected to the tower and carriage assembly cross members through a pin that fits in a milled, bolted-on anchor block.

Two different pitches of roller chain are used in the steering system. Use of roller chain tension linkages permits the steering hand wheel to be located a considerable distance ahead of the rear steering axle. It also provides a compact mechanism and a positive drive through sprockets. A small roller chain connects the steering gear to the booster. There are four short lengths of roller chain in the steering control linkage assembly. Two lengths of a larger roller chain are provided in the steering drive mechanism. Proper tension of both chains is maintained by eccentric idler sprockets held against the chain by spring tension.

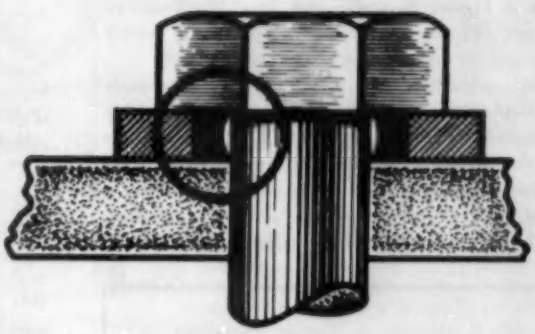
In addition, double width drive chains between the differential axle and the front axle, completes the chain utilized in the lift truck. The simple, easy to maintain hydraulic system and the use of both cable and roller chain for efficient transmission of power assure long, trouble-free service.

Photographs were furnished by Ross Carrier Company and Morse Chain Co. Data on chains was supplied by Morse Chain Co.



INCLUDING the double drive chain between the differential and front axle shown on a partially disassembled bogie, chains are used to power all operating movements of the truck.

Bonded Seals



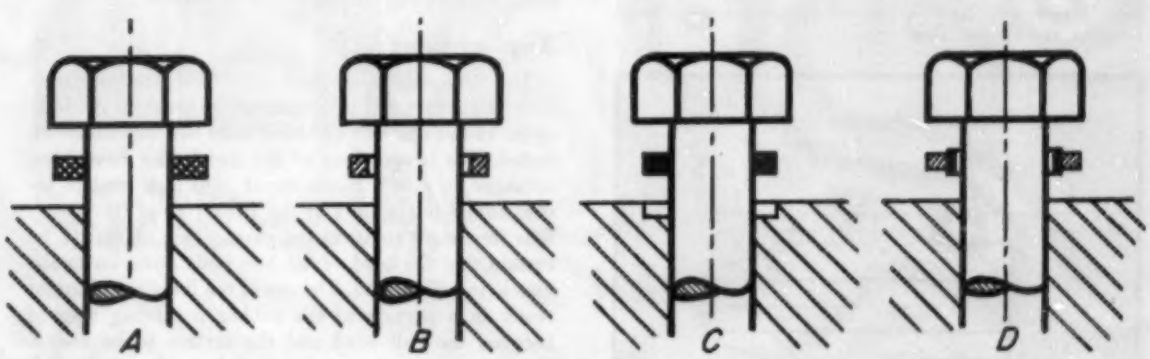
. . . how and where to use them

By John A. Lankester

THE well known axiom that the strength of a chain is no greater than its weakest link applies equally to hydraulics, inasmuch as any hydraulic system is no better than its seals. For many years designers of hydraulic components, both aircraft and industrial, have sought a means of providing a reliable and durable static seal. The bonded seal, an English development recently introduced in the United States, is the result of this search.

The bonded seal has been evolved over some years

FIG. 1. DEVELOPMENT of gasket seals. A plain fiber washer or gasket is shown at A; soft metal or metal-mineral combination is illustrated at B; the next step was to provide a groove or recess for a synthetic rubber seal, as at C; by combining a rubber sealing element with a separate steel retaining ring, as at D, the groove is eliminated but assembly damage hazards and inspection difficulties remain.



Bonded Seals

and in its present form was patented during World War II, by its inventor George H. Dowty, well known British designer and manufacturer of aircraft and industrial hydraulic equipment.

The types of seal which the bonded seal supercedes are shown in Figure 1, and range from the familiar fiber washer, (a), to the composite seal, (d), which was the immediate forerunner of the bonded seal.

Fiber sealing gaskets, Figure 1,a, are cheap enough but quite inadequate for high pressures; they require periodic tightening which spreads them until eventually, under excessive tightening or pressure, they burst or disintegrate.

For sealing higher pressures a soft metal gasket, Figure 1,b, or copper-asbestos joint eliminates the snag of disintegration; however, these too require periodic tightening. Also, they lack sufficient resilience to overcome breathing of a component under sharply fluctuating pressures. A variant of this type is the hollow, tubular metal seal filled with inert gas compressed to about 500 psi which helps to give it resilience.

The next step in the evolution was the synthetic rubber seal fitted into a recess in one of the sealing faces, Figure 1,c. This provided all the necessary resilience and was successful for retaining high and low pressures; but the machining of the recess to prevent extrusion was an added cost. Also, the assembly presented some difficulties due to the risk of nipping the corners and cutting the ring.

To dispense with the necessity of machining the recess the composite seal, Figure 1,d, was produced. This seal consists of a rubber sealing ring surrounded by a steel retaining ring. This gave a good resilient seal and was more economical on machining. Since this seal could be nipped or pinched and cut on assembly, it could be used only a limited number of times. One of the principal objections to this type seal, particularly on aircraft hydraulic systems, was the difficulty of inspection. There was no assurance that the seal had been inserted. Even a pressure test was not certain to reveal this omission since the steel ring might well effect a temporary seal with hard tightening, especially on light alloy materials. Though no leakage might be apparent on test, a blow, shock or vibration could easily start a leak in service with possible serious consequences.

The one-piece bonded seal, capable of holding high and low pressures, overcomes the drawbacks experienced with its predecessors. Figure 2 shows schematically the present form of the bonded seal. It is economical and sufficiently resilient to seal surfaces rougher than required with earlier types. Surface finishes of 64 micro inches are acceptable. Inspection is simplified since, if the metal ring is in position, the rubber seal is there also.

The synthetic rubber seal bonded to the steel ring has been carefully designed to give a slight interference or "squeeze" which will accommodate irregularities on the sealing faces and take care of breathing of the joint under fluctuating pressures. When in position the rubber is deformed into a concave inner surface which gives axial as well as radial sealing forces.

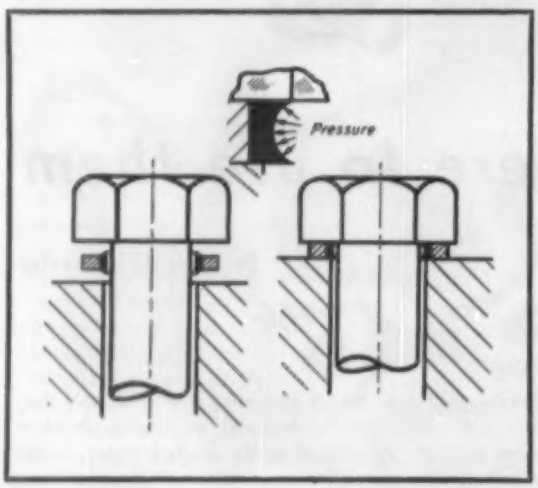
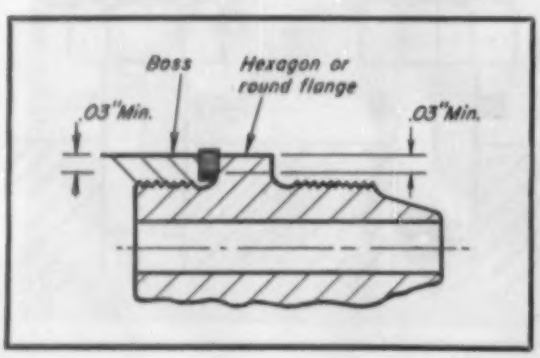


FIG. 2. BONDED, the rubber and steel ring become a one-piece seal. The rubber sealing area is designed to give interference or "squeeze" to seal surface irregularities. In position, the rubber deforms into a concave inner surface (shown exaggerated) which gives axial as well as radial sealing forces.

FIG. 3. FOR SATISFACTORY functioning the rubber element must be fully covered; the metal ring must have a sufficient land surface to insure complete trapping of the rubber ring.



Applications

The applications of the bonded seal are numerous both in aircraft and in industrial components. All hexagon, round and dome-headed bolts can be effectively sealed. The proportions of the metal ring have been arranged to give a minimum of .030 inch land to insure complete trapping of the rubber ring. Obviously, it is important to select the correct size of seal to be certain that the head of the bolt pulls down on to the metal ring all around. The use of too large a seal might result in a portion of the rubber not being trapped between the bolt head and the surface to be sealed. For this reason concentricity of the seal and the bolt is necessary as with any seal of this type. It is also

FIG. 4. THIS SKETCH illustrates the relation of the rubber ring to the width of the metal retainer. The hole in the metal ring is larger than the bolt hole, insuring that the rubber will contact both the bolt head and the other sealing surface.

important for the bolt hole to be square with the sealing surface.

Seals are so designed so that the hole in the metal ring is larger than the bolt hole. This is so the rubber will contact both the bolt head and the other sealing surface. Figure 4 shows this relationship. If the bolt hole is larger than the hole in the metal ring, an effective seal cannot be maintained. For an effective seal some rubber must be between the two metal surfaces.

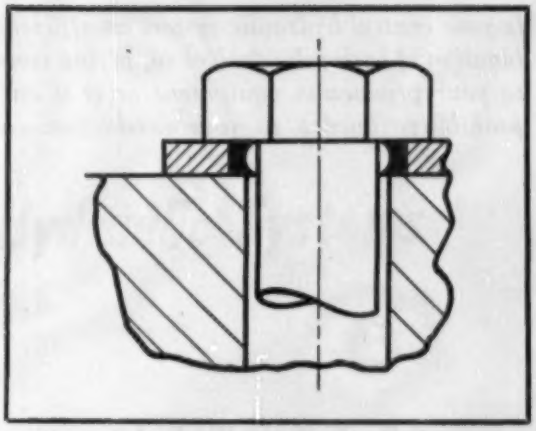


FIG. 5. THE SIMPLICITY of installation of a bonded seal, here being fitted on a large fuel pipe union, is a definite advantage. This advantage is considerable in tight quarters on industrial as well as aircraft applications.

Dome or cap nuts, rivets, unions, banjo connections and pipe connections can all be sealed effectively with the bonded seal. Figure 5 illustrates an established application of the bonded seal to a pipe coupling.

The de Havilland Comet, the world's finest jet airliner, provides an unusual instance of the use of bonded seals. The wing structure of this aircraft forms the fuel tanks—no separate cells, tanks or bladders being used. A large number of bonded seals are used under the

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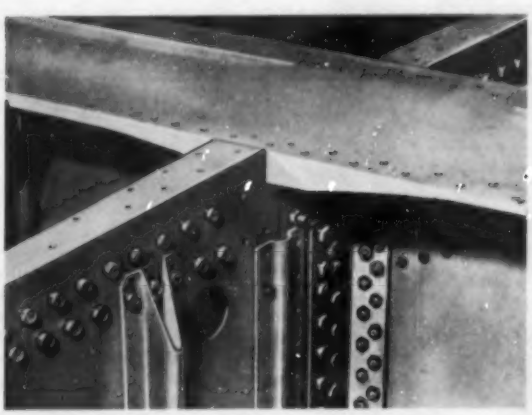
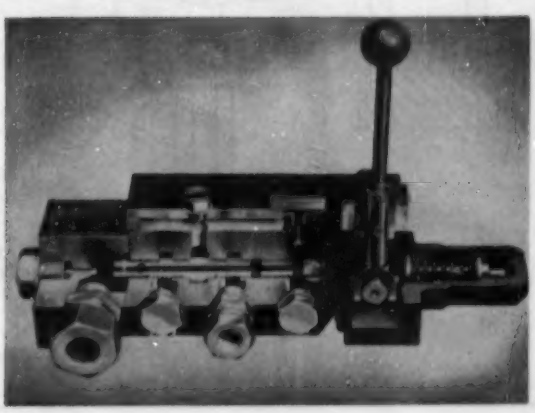


FIG. 6. BONDED seals make it practical to utilize structural areas in aircraft wing structures as fuel tanks.

FIG. 7. BOTH PLUGS and connections on functioning ports on this standard industrial 4000 psi control valve are equipped with bonded seals.



Is your central hydraulic system an efficient, economical combination of hydraulic devices supplying constant fluid pressure to your production equipment or is it an unnecessary, even prohibitive burden to your production costs? Here is . . .

A NEW APPROACH

By William W. Lytle

CENTRAL systems are currently used to power many types of hydraulic equipment but are most commonly used in the rubber and plastics industries to operate hydraulic presses. Most of these systems use a combination of water with water soluble oil as the hydraulic medium but the principles outlined below apply to oil hydraulic central systems as well.

The purpose of this article is to show:

1. That even minor changes which are not difficult to make will pay dividends in better production with less maintenance;
2. That the difference between efficiency and waste in the operation of a central system is relatively small dollar wise;
3. A method of increasing the capacity of your high pressure system;
4. A means of adding the advantage of adjustable pressure control to any or all of the production equipment operating on your central system:
5. That if you are not enjoying the chief advantages of the central system, which are lower initial cost and lower operating cost, you must take steps to correct this condition or risk losing your market.

A central system requires:

1. Electric, steam or air driven pumps to pressurize the system;
2. Devices for controlling system pressure within the variation consistant with product control;
3. Storage capacity to provide equipment actuation under periods of peak demand beyond normal pumping capacity;
4. Safety devices to prevent over-pressuring the system;
5. Return tank or sump to hold fluid as it is returned from the point of usage and stored for recirculation;
6. Provision for filtering the hydraulic fluid to remove entrained abrasive materials before recirculation;
7. Adequately sized tubing or piping and valving ar-

WILLIAM W. LYTLE, President, Lytle Engineering Co., Cleveland, Ohio

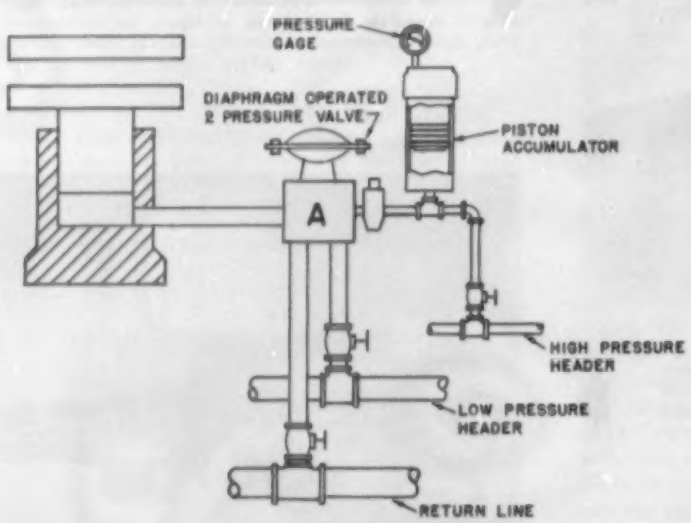


FIG. 1. A CENTRAL hydraulic system with a piston type accumulator mounted between the high pressure header shut-off valve and the automatic two-pressure valve.

to the Design of Central Hydraulic Systems

ranged to eliminate unnecessary elbows, tees and other fittings; and

8. Maintenance personnel who understand the system and its components.

Where any appreciable volume of fluid is required before the maximum pressure or tonnage is needed as in the case of a hydraulic press, the most economical method of closing this press is to use two separate and distinct central systems; one system to provide a large volume of low pressure fluid and the second system to provide a small volume of fluid at the pressure necessary to develop the proper tonnage on the press ram for forming the product.

The transition from low to high pressure may be accomplished by manual valve operation but most plants use automatic two-pressure valves. In order to understand the operation of the automatic two-pressure valve, is must be understood that press or cylinder closing speed is not so much a function of hydraulic pressure as of the volume of fluid delivered to the ram or cylinder. The low pressure fluid does not build up any appreciable pressure as long as the actuated cylinder or ram is moving, i.e., until the end of the stroke is reached. At this point, fluid from the high pressure system is automatically admitted. The second position of the valve shuts off both high and low pressure supply opening the cylinder to drain. The weight of the ram and other moving parts forces the fluid back to the return tank completing the cycle.

Most low pressure hydraulic systems are designed for an operating pressure of about 250 psig. This is sufficient pressure to insure adequate closing speeds with properly sized valves and lines. Undersizing of either of these items will waste power as well as initial cost and require operating at a higher pressure than should be necessary. Other factors which could and should be corrected may influence operating pressure. For example, some presses are operated with push back cylinders which are tied directly into the high pressure system as the press is being closed. A press with a 20 inch ram and two 4 inch push back cylinders operating at 3000 psig requires an additional 240 psig of low pressure fluid just for closing the press over the pressure which would normally be required.

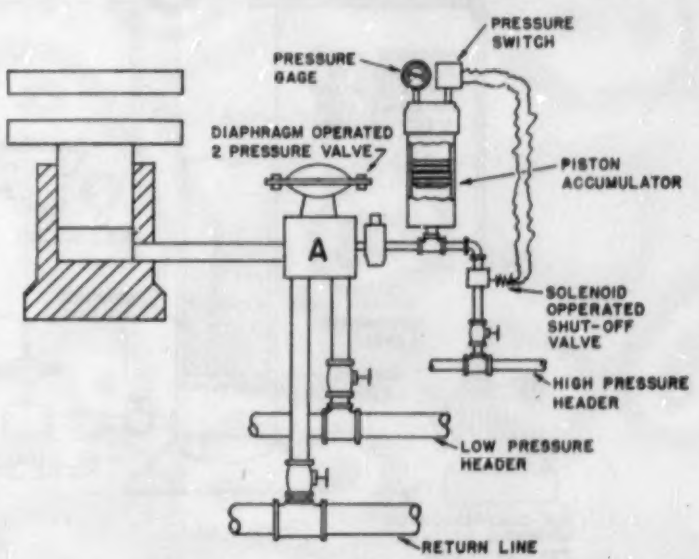


FIG. 2. AN ARRANGEMENT of a piston accumulator, pressure switch, gauge and solenoid operated valve to permit independent hydraulic pressure lower than central system pressure.

Also, the effective press tonnage is reduced by 38 tons —the force tending to open the press while the press is closed. Valving the press push back cylinders would correct this condition.

Use of Piston Type Accumulator

Figure 1 shows a piston type accumulator mounted between the high pressure header shut-off valve and the automatic two-pressure valve. A pressure gauge mounted in the air end of the piston accumulator indicates the line hydraulic pressure. This arrangement offers several important advantages:

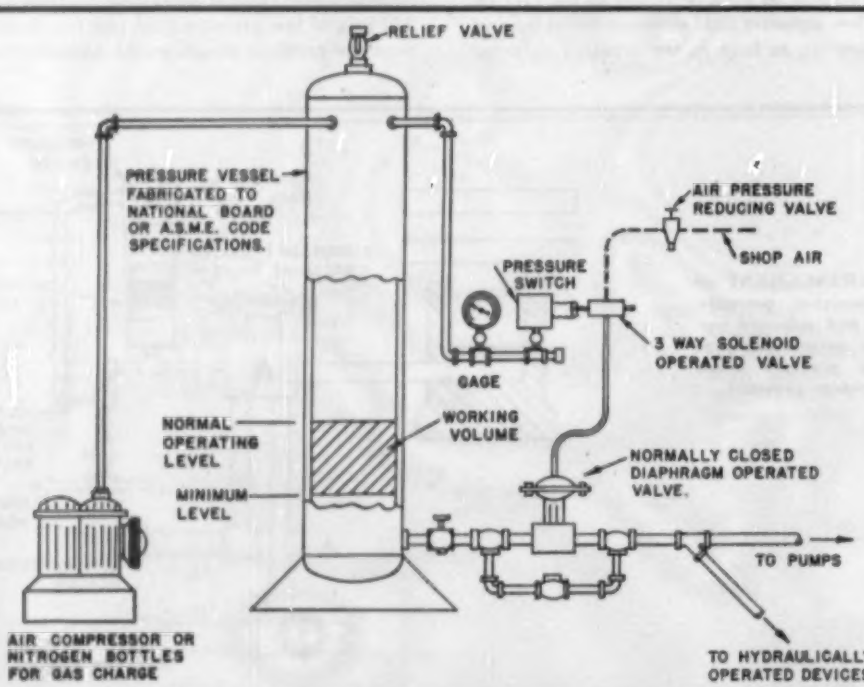
1. If the automatic valve (A) is leaking, this condition can be quickly detected by closing the HP header valve while the press is closed. The pressure gauge will reflect any loss in high pressure fluid through the valve into the return line.
2. Lack of this facility—this ability to quickly isolate leaky valves imposes a burden on the high pressure pumping equipment. One plant which we recently inspected is operating seven high pressure pumps where two pumps should carry the load. This situation is not entirely due to failure to detect leaking valves as the high pressure piping is inadequately sized and wanders about the plant with the nonchalance so often found in older plants which started with ten or fifteen presses and expanded according to market demand but without regard to good hydraulic practice. Plants in this category are paying a prohibitive maintenance penalty and can only survive by taking immediate steps to correct these conditions.
3. The storage of high pressure fluid at the press reduces fluid velocity and so reduces both friction loss and shock.

Figure 2 shows a combination of a piston accumulator, pressure switch, pressure gauge and solenoid operated valve arranged to permit press operation at any desired hydraulic pressure lower than the central system pressure. This combination introduces a flexibility to the central system which gives it the variable pressure control advantages of individually powered units. This feature will be of particular interest to those industries where product control is becoming more critical. This same principle can be applied to actuate auxiliary hydraulic devices such as transfer cylinders which can operate more efficiently at a lower pressure than the ram clamping pressure.

Figure 3 illustrates the basic elements of a typical high pressure bottle accumulator system. These elements are:

1. A coded pressure vessel designed to hold hydraulic fluid under pressure available for momentary demand. This fluid works against a gas pressure with the gas confined to the upper portion of the vessel and acting in the same manner as a spring to force fluid into the lines to replace fluid being used at intermittant intervals throughout the system.

FIG. 3. ELEMENTS of a high pressure hydraulic system with a typical bottle accumulator and standard operating controls. Normal gas to fluid ratio in the accumulator is 2:1.



2. A safety shut-off valve to isolate the above vessel from the rest of the system to prevent the escape of the gas charge which follows the fluid in the case of an abnormal pressure drop in the system.
3. A method for restoring the gas volume losses through absorption in the fluid, leakage or as in (2) above.

Most high pressure central systems use an accumulator bottle or pressure vessel with an internal capacity of from 100 to 200 gallons and a gas-fluid volume ratio (at normal system pressure) of from 2:1 to 3:1. The high pressure system pressure should not vary more than 10 percent below normal operating pressure as any wider variation may affect the product. Assuming a 120 gallon hp accumulator coded for 2130 psig and operating at a normal working pressure of 2000 psig and a gas-fluid ratio of 2:1.

THEN $P_2 V_1 = P_2 V_2$ (Boyle's Law)
WHERE P_1 is initial pressure (2000 psig)
P_2 is final pressure (1800 psig)
V_1 is the initial gas volume (80 Gal.)
V_2 is the final gas vol.
SOLVING for V_2

$$2000 \times 80 = 1800 \times V_2$$

$$V_2 = 87.8 \text{ Gal. (Approx.)}$$

Since the difference between the initial and the final gas volumes must represent the volume of hydraulic fluid displaced and hence, the capacity of the accumulator.

THEN

$V_2 - V_1 = 87.8 - 80 = 7.8$ Gal. – accumulator capacity

Boyle's Law and the example of its application above leads us to the conclusion that we could increase the efficiency of this accumulator and get more fluid with same amount of pressure drop, by increasing the gas-fluid ratio. This is true but must strike a compromise with the fact that a safe minimum level must be maintained which is a safe distance above the discharge nozzle to prevent losing the gas charge.

Figure 4 shows the same accumulator shown in Figure 3 with the safety shut-off valve and controls removed and the piping rearranged so that the bottle accumulator now discharges into the air ends of the two or more piston type accumulators. The manifold on the fluid end of the piston accumulators discharges to the high pressure system. Using the same accumulator bottle as a receiver and under the same pressure conditions as above and assuming a total volume of 20 gallons in the piston accumulators—

THEN $V_2 = 140$ Gal.
$P_2 = 1800$ Psig
$P_1 = 2000$ Psig
SOLVING for V_1

$$V_1 = \frac{1800 \times 140}{2000}$$

$$V_1 = 126 \text{ Gal.}$$

THEN

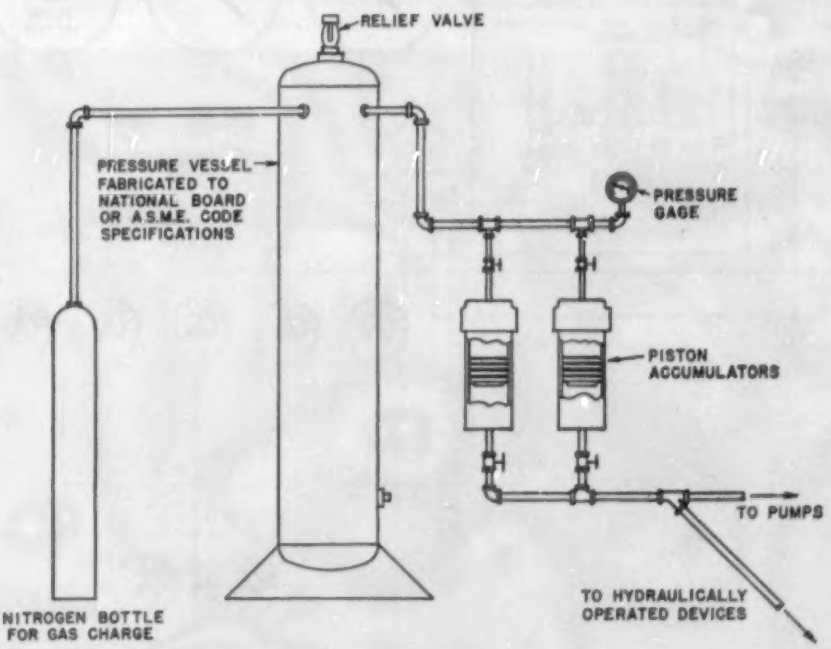
$V_2 - V_1 = 14$ Gal. which is the new capacity of the HP system.

Revamping your high pressure system along the above lines offers you:

1. A method of almost doubling your present capacity.

Concluded on page 96

FIG. 4. THE SAME accumulator shown in Figure 3 with safety shut-off valve and controls removed and the piping rearranged for the accumulator to discharge into the air ends of two or more piston type accumulators. This arrangement can greatly increase the accumulator capacity.



A PRESSURE TEST on a telescoping cylinder is easily and quickly set up. The operator is shown opening the volume control valve.

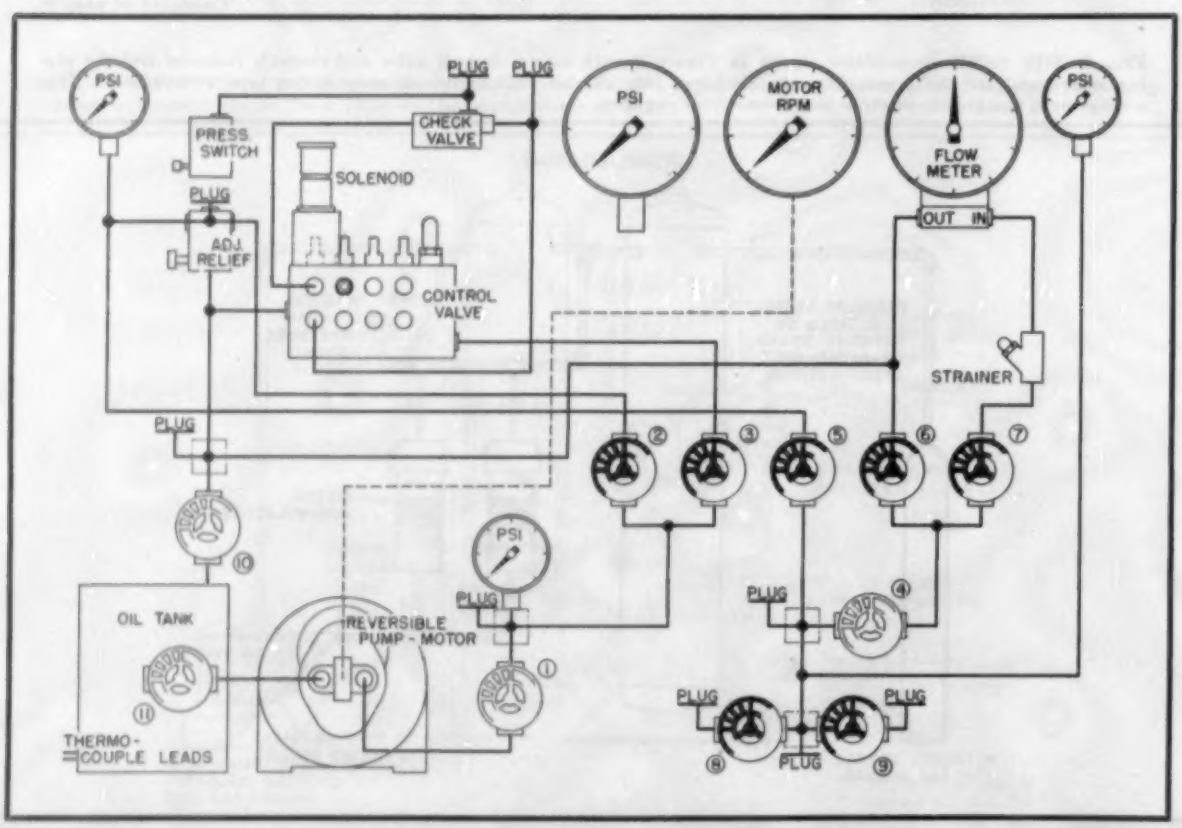
Circuit Design to Check

By J. A. Ackermann

A SIMPLE, portable test stand, designed and built in the Experimental Department of The Elwell-Parker Electric Company is in daily use testing pressures and flow of the hydraulic circuits which power the movements of the line of industrial trucks manufactured by this company. Both the main truck circuits and circuits of attachments and auxiliary units are

J. A. ACKERMANN, Ass't Chief Engineer, The Elwell-Parker Electric Company, Cleveland, O.

SCHEMATIC DIAGRAM indicates the flexibility of the unit for combinations of pressure and volume testing.



for Shop-Built Test Stand Pressure — Flow — Limits

checked quickly and accurately with the stand.

The stand is designed to test full or reduced flow, full or reduced pressure, or any combination of pressure and flow. The adjustable relief valve is screw adjustable, and one plunger in the control valve is solenoid operated. The remainder of the plungers are hand lever operated.

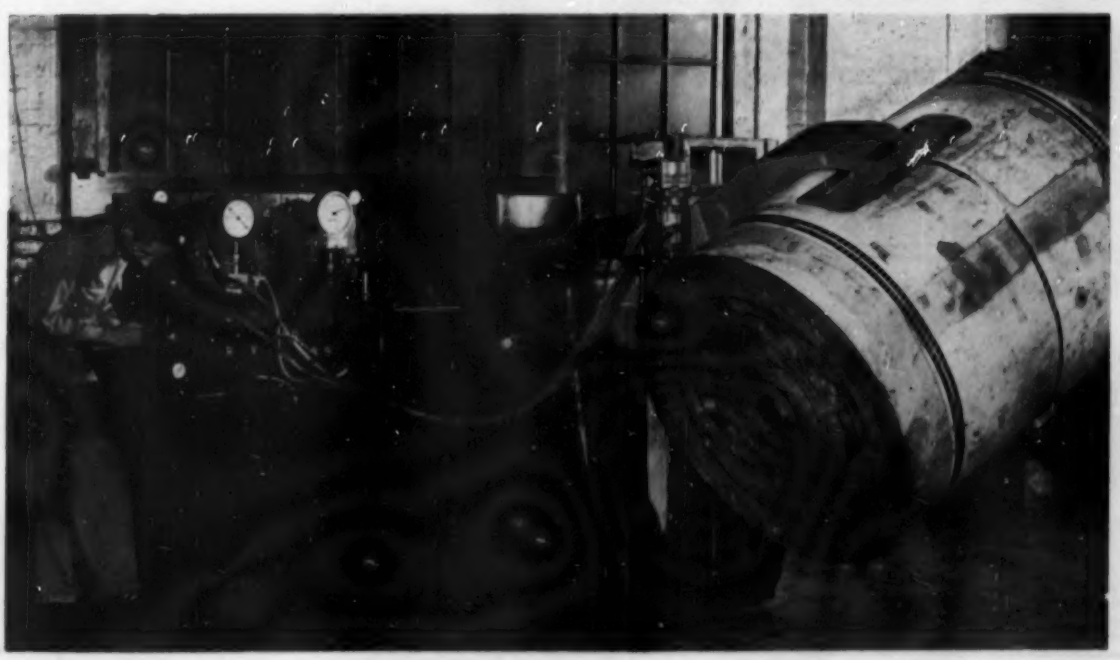
D.C. Motor Drives Gear Pump

The stand is equipped with a reversible, low voltage, direct current motor which drives a gear type hydraulic pump. The pump and motor are similar to those used on industrial trucks manufactured by the company. To permit testing under a wide variety of conditions, and to measure as many variables as possible, such equipment as a tachometer to measure motor RPM's, flow meter, thermocouple to measure oil temperature, cold water circulating coils inside the oil tank to maintain constant oil temperature, etc., have been included in the design.

The combination of circuits possible on the test stand permits testing any truck circuit as well as an endless variety of truck attachments and special devices. It is possible to check the operating characteristics of any type hydraulic cylinder, pump or fluid motor, plus a wide variety of valves and other control devices.

The test stand has been in operation for almost three years and has been subject to numerous revisions to improve its operation and to increase test possibilities. Being portable the stand is conveniently used in the experimental room or can be moved out into the manufacturing area to make on-the-job inspections and tests on production models prior to shipment. The stand is of course used extensively in experimental and developmental work.

A COMBINATION pressure and volume test is in operation to determine optimum system conditions for operating a revolving clamp.



Proper Hydraulic Circuit Design

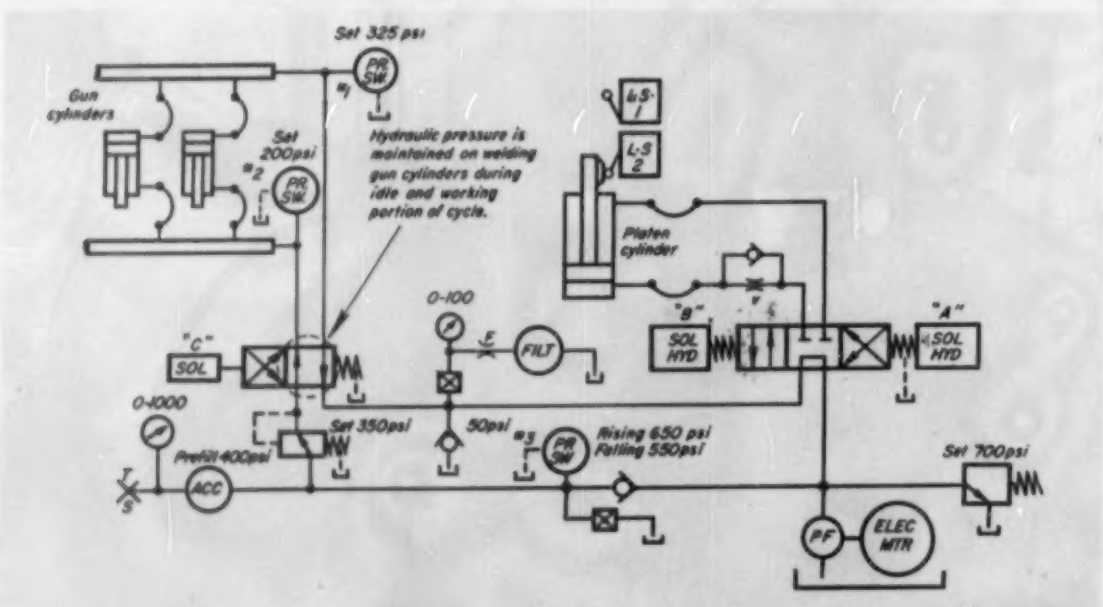
REDESIGN of a welder circuit used on spot weld machines in a large automotive plant was carried out to prevent a reoccurrence of what had been a serious fire. The revised circuit removed the fire source and at the same time resulted in a circuit which had less piping and fewer components.

The fire source that had to be removed was the continued flow of hydraulic oil from a ruptured line near the hot weld electrodes. Using the original hydraulic system, shown below, when a line broke, there was a continuing spray of hydraulic oil from the accumulator to the hot electrodes.

To obtain a safe circuit, the complete hydraulic system and its electrical control arrangement was revised. Because all valves and the pump were changed, the initial cost of this new circuit was considerable. Its cost, however, did not begin to approach the loss caused by the original fire.

In the redesign, the spring offset, two position, 4-way valve was replaced by a spring centered, three position valve. Electrical control of the valve was arranged so that the flexible hose lines to the welding guns are only under pressure when doing work. The accumulator was removed and the constant displacement pump was replaced by a pressure compensated pump. At the present time, with welders equipped with the new circuit, when a flash fire does occur, the source of fuel is shut off as soon as the machine cycle is completed. The operator has to re-initiate the cycle each time.

If a line broke this circuit would feed a fire



Can Reduce Fire Hazards

Will your circuit fail safe? If a line breaks, the pump should not empty the oil supply through the break.

Operation of the Unsafe Circuit

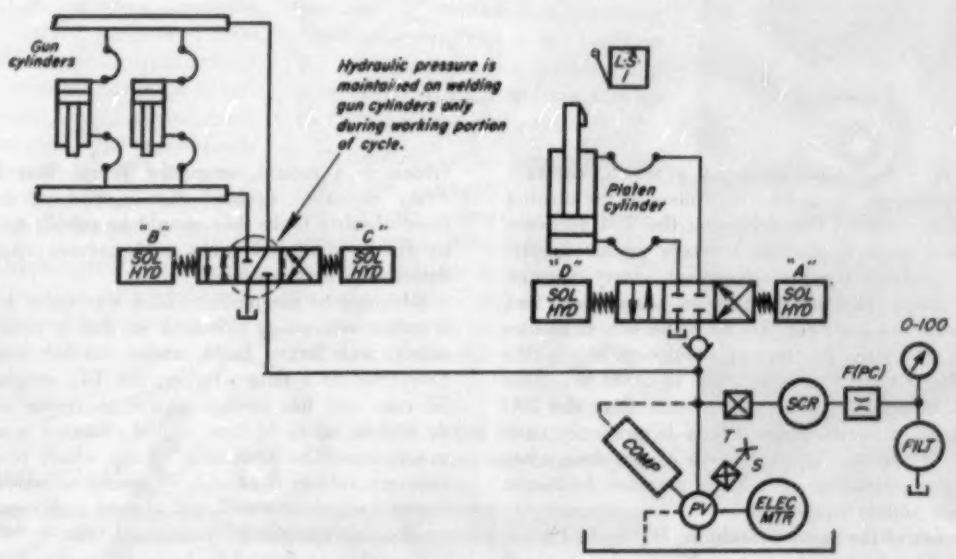
With the pump motor running and parts loaded ready for welding, the operator depresses the cycle start button, energizing solenoid "A", raising the platen and tripping limit switch LS-1. LS-1 energizes solenoid "C", actuating the gun cylinders. Pressure switch, PS-1, operates to cause reversal of the gun cylinders. After the guns retract, PS-2 operates to cause lowering of the platen. At the bottom of the platen stroke, LS-2 is tripped. At this point, solenoid "B" will be deenergized to put the three position valve in neutral if PS-3 is tripped.

Tripping of PS-3 assures charging of the accumulator to 650 psi. During idle operation, PS-3 will alternately energize and deenergize solenoid "B" to maintain accumulator pressure.

How the Safe Circuit Works

Operation of the safe circuit is simpler than the unsafe circuit. All pressure switches and one limit switch have been removed. Gun and platen reversal is controlled by a cycle weld timer which is started when the platen raises and trips LS-1. At the end of the return strokes, a fire protection timer times out to deenergize solenoids "C" and "D". This causes both valves to shift to neutral and the pump to center to its minimum delivery position.

. . . this circuit would not



A 2000 psi hydraulic system is used on a tank recovery vehicle. Space is saved—high torque output is available.

Get more work from winches with . . .

High Pressure Hydraulic Control on MOBILE EQUIPMENT

WITH a hydraulic drive on a winch, constant torque can be applied regardless of the turning speed of the winch. The drives on the T74 recovery vehicle use fixed displacement rotary pumps supplying oil to drive fixed displacement rotary motors. Driving torque depends entirely on oil pressure and fluid motor displacement. To keep the winch motors a reasonable size, the torque requirements on this application required pressures up to 2000 psi. This pressure range is considerably greater than the 800 to 1200 psi pressure range which is presently used on most mobile equipment. Success of this design has proved the reliability of a high pressure hydraulic system on mobile equipment.

Designers of the recovery vehicle, Bowen-McLaughlin-York, Inc., had to obtain a hydraulic circuit which would withstand the most severe type of service which can be expected from a mobile unit. The recovery vehicle is a rebuilt, outmoded World War II tank. Army ordnance decided that instead of scrapping these obsolete tanks they should be rebuilt to be used to rescue damaged tanks and prevent capture or destruction by the enemy.

Redesign of the medium tank was quite a job for it meant converting this tank so that it could rescue newer and larger tanks under combat conditions. Converted to a tank wrecker, the T47 weighs nearly 50 tons and has enough power to rescue any tank or vehicle, up to 45 tons, out of whatever it might be mired into. The hydraulic system which powers the recovery vehicle is capable of towing as well as hoisting and winching a tank out of mud and deep ditches, or flipping upright an overturned tank.

Complete control of the hydraulic system is obtained with pilot control valves. Less than one pound effort by the operator applied to the control valve lever

How 35 Tons of Controlled Effort Positions the boom of this drilling rig . . .

For the smooth, fast, and safe erection of the boom of the Franks rotary drilling rig, two "Commercial" two-sleeve telescopic cylinders with 117" stroke work in parallel. Each develops an initial thrust of over 35,000 pounds on the push stroke when operating under oil hydraulic pressure of 1000 psi. To provide the positive initial force required to move the boom off its vertical dead center toward its horizontal traveling rests, the second sleeve of each cylinder is built with a double-acting feature which develops a thrust of over 19,500 pounds on the pull stroke.

Only telescopic cylinders provide a means of obtaining long stroke and yet occupy relative small space when in closed position. Here is another good application of this principle—distance pineye to pineye in closed position 74", extended 191". "Commercial" is the largest manufacturer of 2, 3, 4 or 5 sleeve telescopic cylinders, all designed for operating at pressures up to 1500 psi. They are available in single-acting type having capacities up to 25 tons on the push stroke and in double-acting type having, in addition, capacities up to 15 tons on the pull stroke.

"Commercial" has been producing heavy-duty oil-hydraulic controls for over 25 years—pumps, motors, valves, and cylinders—all dependable and built to give trouble-free operation. You will do better to place all your oil-hydraulic problems with one producer. Consult with a "Commercial" engineer.

"COMMERCIAL"
"PRODUCTS PREFERRED BY CUSTOMER ACCEPTANCE"

PUMPS • MOTORS • CYLINDERS • VALVES

THE COMMERCIAL SHEARING AND STAMPING COMPANY
Youngstown, Ohio Chicago, Illinois Salt Lake City, Utah

KA-53

Oil-hydraulic is the fluid power that gives positive, sensitive, and controlled action; and oil-hydraulic controls occupy less space, provide cleaner installations, have fewer moving parts, and go a long way in reducing costs.

It's getting hard to find a piece of heavy-duty construction equipment today that does not utilize the advantages of oil-hydraulic controls.

HYDRAULIC CIRCUIT—Three vane type fluid motors are powered by a double vane pump. Motor output torque is controlled by movement of the pilot valves which change pressure to the vent ports of the relief valves. Overload protection is supplied by the 2000 psi maximum setting of the main relief valve. Brake control is supplied by oil from a small 1000 psi pump applied to single acting brake cylinders.

Courtesy Dudco Division, The New York Air Brake Co.

will control a line pull of 85,000 pounds, whether the line travels 6 ipm or 50 fpm.

The T47 is equipped with a front spade so designed as to stabilize the vehicle for extremely heavy lifting and towing. The design of the spade also permits its use as a bull-dozer. This feature permits the improvement of terrain when adverse conditions prevail at the site of recovery operation. The spade may be stowed, released and adjusted to desired height for all operations from within the vehicle, without the exposure of the crew to hostile fire. The boom is raised into operating position by hydraulic cylinders, which may be used to provide a live boom, allowing the spotting of heavy loads for and aft with precision control, when movement of the vehicle is not actually desirable.

Hydraulic power is supplied by a 2000 psi, vane type double pump and a 1000 psi gear pump. One 2000 psi pump supplies the main tow winch, the boom winch, and boom elevating cylinders. The second 2000 psi pump supplies the auxiliary winch. The 1500 psi pump supplies power to take the brakes off the three winch motors when cable is to be reeled.

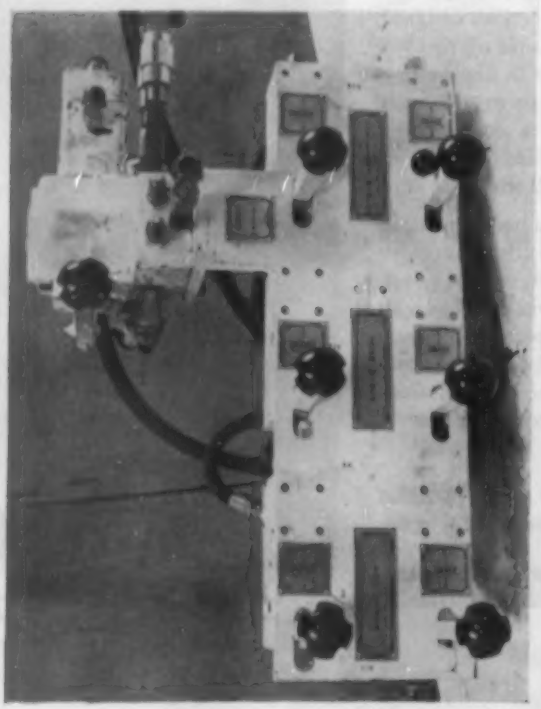
Power to drive the pumps is taken from a power take-off on the main vehicle engine. A simple clutching mechanism detaches the pump from the drive when oil power is not needed.

Valves Grouped on Subplate

From the pumps, hydraulic oil goes to a main valve subplate. All valves are mounted on this plate. From the valve panel, oil flows to a hydraulic motor on each winch or to the cylinders that raise the boom. The use of oil pressure, limited to a maximum of 2000 psi, makes it unnecessary to have shear pins which are commonly used in mechanically powered winch drives.

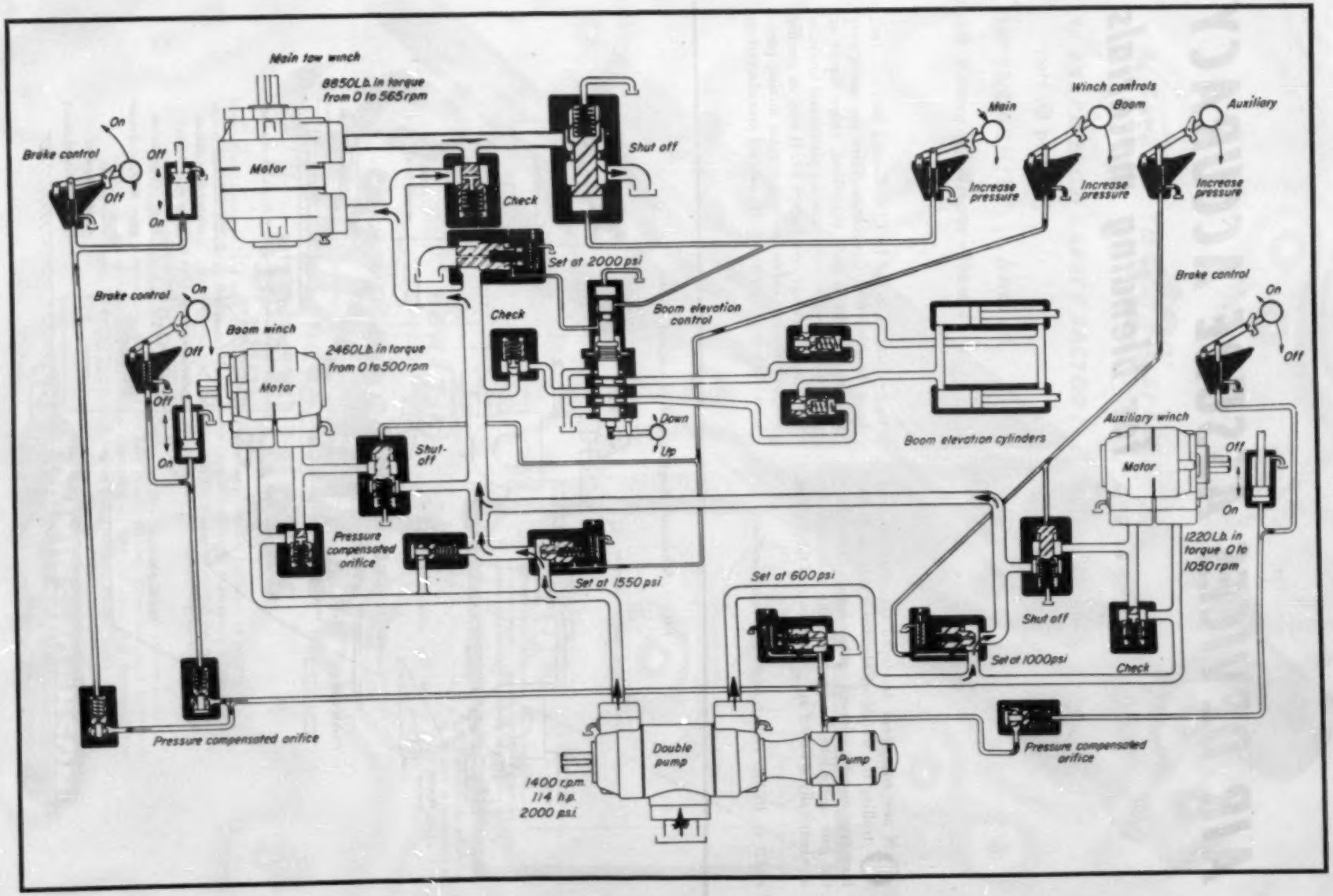
Since the winches are equipped with a reverse gear, it was thought better to use this gear rather than to double up on the valves in the hydraulic system which

Concluded on page 98



CONTROL OF THE HYDRAULIC SYSTEM of the recovery vehicle is obtained from this panel. Pressure is regulated by movement of the motor control handles. Winch brakes are applied or removed, and raising and lowering the boom is controlled.

WITH THE FRONT SPADE dug into the ground to stabilize the recovery vehicle, the hoist can lift a 45 ton tank out of a ditch or can flip upright an overturned tank.


Main tow winch
8850Lb. in torque from 0 to 565rpm
Motor
Brake control
On
Off
Off
On
Check
Shut off
Set at 2000psi
Winch controls
Main
Boom
Auxiliary
Increase pressure
Increase pressure
Increase pressure
Brake control
On
Off
Boom winch
2460Lb. in torque from 0 to 500rpm
Motor
Off
On
Check
Boom elevation control
Down
Up
Boom elevation cylinders
Shut-off
Pressure compensated orifice
Set at 1550psi
Set at 600psi
Auxiliary winch
Motor
Off
On
1220Lb. in torque 0 to 1050rpm
Shut off
Set at 1000psi
Check
Pressure compensated orifice
Double pump
Pump
1400 r.p.m.
11.4 h.p.
2000 p.s.i.
Pressure compensated orifice

AIR DEVICES ASSURE ACCURACY

. . . for blending materials

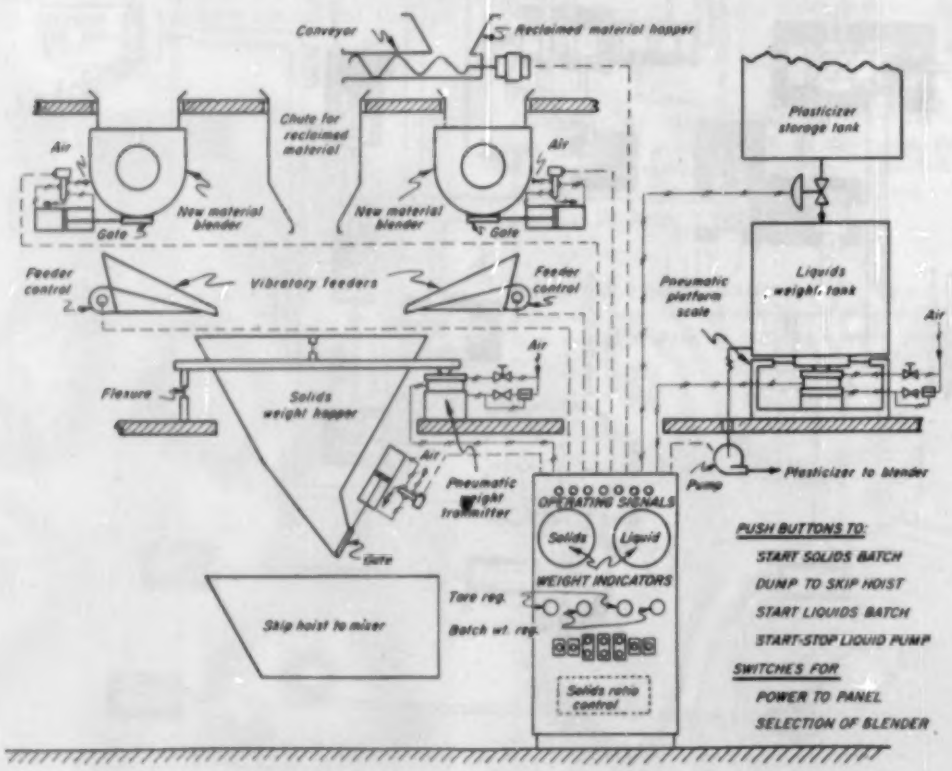
By Fred G. Herr

ON new equipment developed for accurately controlling the weight of blended materials in Banbury-type mixers, solenoid operated air valves control the gate operations for proportioning materials, and an electrically actuated air circuit controls the feeding.

FRED G. HERR, Project Engineer, Congoleum-Nairn, Inc.

This system, designed by CDC Control Services, Inc., in cooperation with Congoleum-Nairn engineers, controls the weight of each ingredient, either liquid or solid, that is used in compounding plastic and linoleum base floor coverings (see Figure 1). It may be readily adapted to other industries with similar mixing problems, such as rubber and roof covering manufacturing.

FIG. 1. Schematic diagram of feed control system.



✓SAVE UP TO 40% SPACE!

✓EXTRA HIGH SAFETY FACTOR!

✓DEPENDABILITY . . . backed by 38 Years of Know-How!

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Off shelf delivery all styles to 3" bore in increments of 1" to 12" stroke.

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Spacemaker

AIR CYLINDERS

Streamlined design of the new T-J Spacemaker *eliminates tie rods . . . saves up to 40 % in mounting space!* It's performance-proved . . . *super rugged* with extra high safety factor . . . solid steel heads . . . heavy wall, precision honed, *hard chrome plated,* seamless steel body . . . leakproof cylinder head to body construction . . . heavy duty, hi-tensile, *hard chrome plated* piston rod.

Available with the new T-J Super Cushion Flexible Seals which insure positive cushion with automatic valve action for fast return stroke. Many standard sizes and styles . . . for pushing, pulling, lifting, clamping or control jobs. T-J dependability. Write for bulletin 454. The Tomkins-Johnson Co., Jackson, Mich.

(T-J) TOMKINS-JOHNSON

DIVISIONS: AIR AND HYDRAULIC CYLINDERS · CUTTERS · CLINCHERS

Air Devices on a Blender

The system operates auxiliary devices to perform the following functions:

Operate vibratory feeders to supply exact amount of new solid base material to weigh hopper from either of two blenders.

Sound alarm when one blender is empty and automatically switch feed to second blender.

Add exact amount of reclaimed base material to weigh hopper in accordance with the desired batch size and ratio of new-to-reclaimed material.

Dump weigh hopper into skip hoist which carries base material into mixer.

Dump exact desired weight of liquid plasticizer into tank from which operator draws during blending.

The system now controls two solid materials and one liquid, but is easily adapted to handle additional compounding ingredients. The solids consist of primarily new material, with a varying percentage of reclaimed base.

Independent adjustments of total weight per batch and of ratio between new and reclaimed material may be made instantly by the operator as his schedule requires, since one adjustment does not affect the other. For example, the system may be adjusted to feed 500 pound batches of 80% new material and 20% reclaimed—or 400 pounds new and 100 pounds reclaimed. Should the operator reset the weight-per-batch adjustment to 400 pounds, the system immediately begins to feed 320 pounds of new and 80 pounds of reclaimed material for each batch. The proportioning ratio of 80:20 remains the same despite change of batch size. Now, if the weight-per-batch setting remains at 400 pounds and the operator adjusts the ratio control to any other figure, such as 75% new material, the system will immediately feed 300 pounds of new and 100 pounds of reclaimed material—still a 400 pound batch.

Accuracy of control of solids is within 0.5% of the net weight—about 2.5 pounds in 500. Two minutes are allowed for the solids filling cycle. In the present system, the accuracy that can be achieved is determined by the type of feeding equipment used—for example, a screw conveyor for the reclaimed material. It is claimed that accuracy of 1¼ pounds in 500 may be gained with the use of high accuracy feeders.

The accuracy of feeding liquid plasticizer is within ¼%. The plasticizer weigh tank fills in less than a minute, and the operator controls the rate at which it is drained. This precise control results in both savings in plasticizer and product improvement.

The system feeds the Banbury-type mixer with exact amounts and proportions of the base materials and compounding ingredients, so that the exact formulations desired are furnished time after time without variation. These high accuracies—which cannot be approached by manual methods—permit much greater uniformity of finished product, and consequent higher quality.

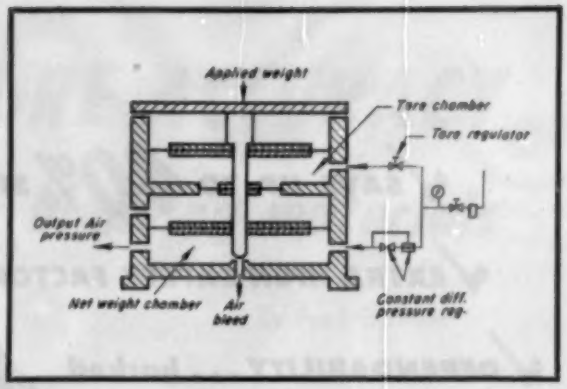


FIG. 2. Schematic of a pneumatic "weigh scale" which operates on a null-balance principle.

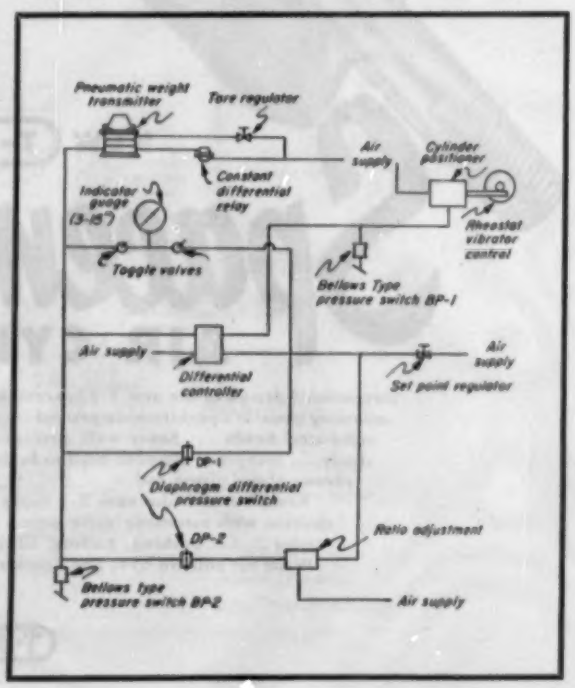
Pneumatic Weight Transmitter

The heart of the control system is, of course, the device which measures weight, and transmits a pneumatic pressure signal that is proportional to the weight applied.

Figure 2 shows a typical pneumatic "weigh scale" which meets these requirements. It operates on a force or null-balance principle, so that response is extremely fast and accurate.

The basic unit consists of a net weight chamber and a tare chamber, each having a flexible diaphragm closing one side. Compressed air is fed to the net weight

FIG. 3. Air circuit for the control system, regulates weight, ratio of scrap to new material, and material feed rate.



Here's how MICRO-KLEAN *halves your filter cartridge replacement costs*

ITS GRADUATED DENSITY IN DEPTH

INCREASES CAPACITY FOR DIRT ACCUMULATION IN CARTRIDGE

DOUBLES THE EFFECTIVE CARTRIDGE LIFE. That's how...

IT CUTS CARTRIDGE REPLACEMENT COSTS IN HALF!

In effect, every MICRO-KLEAN cartridge provides an almost infinite series of screens, ranging from relatively coarse on the outside down to 10 microns in the center.

Because of MICRO-KLEAN's graduated density, particles are trapped throughout the entire depth of the filter element, giving it twice the effective life of ordinary filter cartridges. Thus cartridge replacement costs are cut in half.

If you're looking for dependable, effective filtration at the lowest possible cost, Cuno's MICRO-KLEAN is your answer. You can get MICRO-KLEAN in densities of 10, 25, and 50 microns. M.3.D

GET ECONOMICAL FILTRATION IN YOUR HYDRAULIC SYSTEMS

MICRO-KLEAN lasts twice as long as ordinary cartridge-type filters

If you're interested in economical, effective filtration for a hydraulic system, take a look at a Cuno MICRO-KLEAN filter.

MICRO-KLEAN's high porosity gives you low-pressure-drop filtration on either the high or low pressure side of pumps. Moreover, Cuno's exclusive method of felting fibers results in great structural strength and graduated density in depth. This gives the MICRO-KLEAN much greater capacity for dirt accumulation plus complete protection against channeling, shrinkage, rupture, or distortion. Result: twice the useful life of an ordinary filter element.

That means you have to replace a MICRO-KLEAN cartridge only half as often as most others. And changing cartridges takes only a few seconds—one nut is all you have to remove.

Any MICRO-KLEAN will remove 100% of all solids for which it's rated* plus a large percentage of particles down to 1 micron. Capacities range from a fraction of a gallon to over 800 gallons per minute. Mail the coupon for our free filtration analysis form.

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Making linoleum is one of the many processes requiring blending and mixing of materials. Quality of the product largely depends upon the control of the mixing operation. Here is a detailed description of the pneumatic control system for proper feeding and blending.

chamber and bleeds to atmosphere through a nozzle. A flapper or plug attached to the chamber diaphragms regulates the flow of air through the nozzle. As more weight is applied, the flapper reduces the nozzle opening to increase air pressure in the chamber. The unit balances when the chamber pressure multiplied by the effective diaphragm area equals the weight applied. Falling weight opens the bleed nozzle to reduce pressure to balance the unit at lower pressures. The chamber pressure being a measurement of weight, is transmitted to operate the indicating, recording and controlling devices.

The tare chamber is supplied with a fixed air pressure to counterbalance the fixed weight of tank, hopper and other equipment, so that only new weight is measured. The range of weight of any unit is determined by the air pressure supplied and effective diaphragm area. Best accuracy is obtained with a supply pressure not over 30 psi. The range of the basic unit can be approximately doubled by using two net weight chambers. Two tare chambers can be used when high fixed weights are involved. The effective range of a unit can also be increased by beaming—applying the weight to a pivoted support so that the weigh scale measures only a part of the total force.

Details of Pneumatic Circuit

Refer to Figure 3. The desired batch is set by the operator making two adjustments at the panel.

The indicating gauge is switched to read batch weight and the set point pressure regulator is adjusted so that the indicator reads the total weight desired. This pressure is applied to the differential controller,

FIG. 4. Photo shows the solids weigh hopper, its pneumatic weight transmitter, and the vibratory feeders.

diaphragm differential pressure switch DP-1, and to the input of the ratio adjustment. The ratio adjustment is now made; the output being applied to differential pressure switch DP-2. When the start-batch button on the control panel is pushed, the motor drive of the screw feeder which is supplying scrap is started. As material is added, the pneumatic weight transmitter builds up a pressure, applying it to the process side of the diaphragm differential pressure switches DP-1 and DP-2 and to the differential controller. When the pressure (weight) on switch DP-1 is equal to that selected (set weight x ratio, the ratio always is less than 1) it closes. Through electrical circuits the screw drive motor stops, shutting off the scrap feed. Solenoid pilot valves at the blender are energized, applying pressure which opens the slide gates. At the same time, the vibrator feeder is also energized. The virgin material is then fed and the pressure output of the pneumatic weight transmitter starts building up.

Differential Relay

The function of the differential relay is to provide a control signal which is proportional to the difference between the set pressure (corresponding to the desired batch weight) and the scale pressure (corresponding to the actual weight in the hopper). For the application described here, when the two pressures (weights) are equal, the control signal is to be 15 psig, and when the difference is extreme, it is to be 3 psig. At a weight approximately 30 pounds less than the set weight, it is desired to start changing from 3 to 15 psig. The control signal is applied to a cylinder and positioner which positions a slider on a rheostat. This rheostat is in the vibrator feeder circuit to control feed rate. At a 3 psig control signal, the vibrator feeds at a maximum rate.

At a 15 psig signal, the feed is reduced to a mere dribble. Therefore, material starts flowing into the weight hopper at a maximum rate. When the weight reaches 30 pounds under the desired weight, the differential controller and the cylinder positioner "throttle down" the flow rate. When 15 more pounds are needed to attain correct weight, the differential controller is at 9 psig. It then actuates pressure switch BP-1, closing the slide valve at the blender. The remainder of material to make up the desired weight in the hopper is fed in from what is on the vibrator pan. When the batch weight exactly equals the set weight, switch DP-1 de-energizes the vibrator feeders.

When this operation is completed and the skip-hoist car is in position under the weigh hopper, electric contacts are made which open the hopper gate by means of a solenoid pilot valve and air cylinder. When the batch is completely dumped, switch BP-2 closes, shutting the gate.

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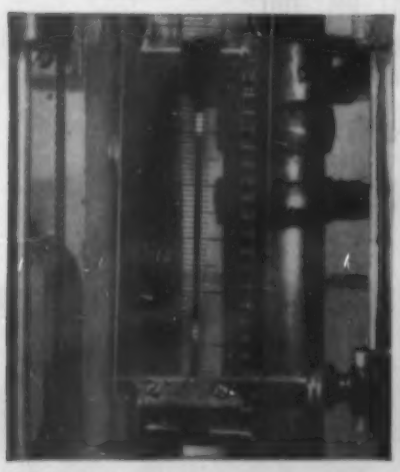

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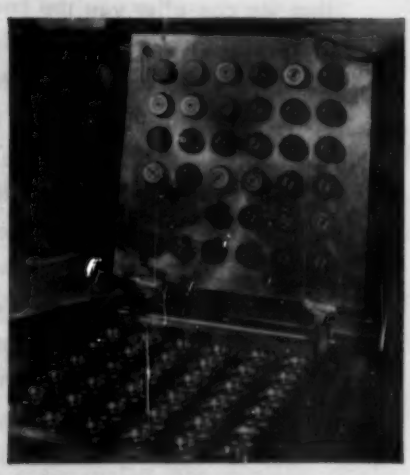

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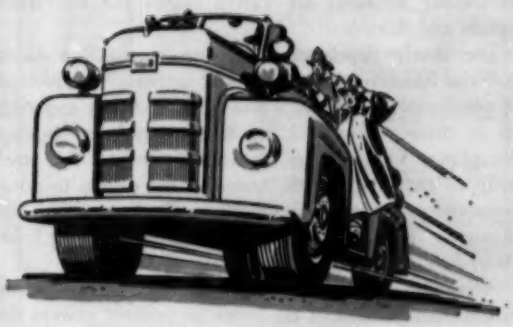

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Design for Air Power

automation in the shipping room. Here's the story of the design of a wire strapping machine that uses air power to cut off dollars from shipping costs.

Provides Linear and Rotary Motions

Compressed air was selected by the designers at Acme Steel Company, Chicago, to power the operations on a package strapping machine, because compressed air is readily available in most shops, both linear and rotary motions can be easily obtained, and the use of electrically actuated air valves makes the operation simple and flexible.

The newly developed strapping machine, reduces material handling operations and increases production by compressing a package and simultaneously applying up to three straps. All machine operations—raising the platen for package clearance, feeding the steel strap to required length, lowering the platen to compress the package, tensioning and, finally, sealing the strapping—are operated at air pressures ranging from 70 to 125 psi.

Seven air cylinders and three rotary air motors are in the circuit. Each of the three air motors powers the feed of one strap, the electrical circuit is arranged so that each of the air motors is operated independently. The same is true for each of the three sealing cylinders.

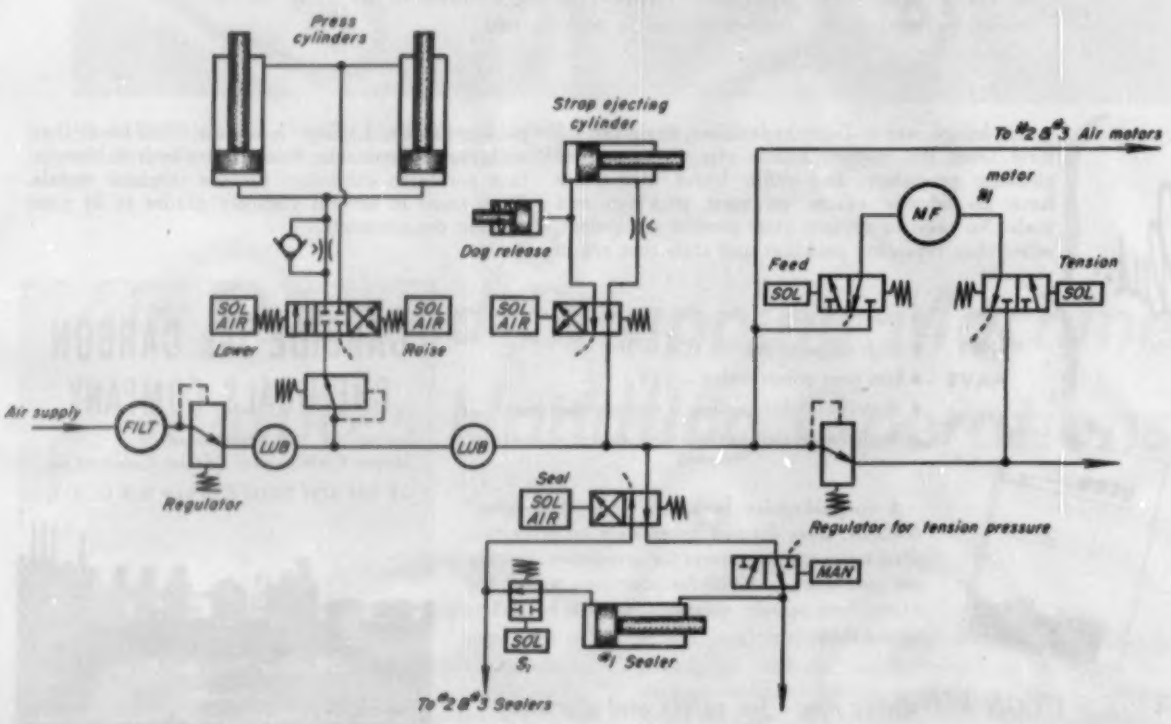
A ¾ inch, four-way, three position solenoid valve controls the two main lift cylinders that raise and lower the platen. Platen pressure is adjusted by a hand controlled pressure regulating valve and a maximum of 2500 pound compression can be applied to a package.

Operating the strap-feed buttons opens three-way solenoid valves that supply air to air motors in each of the three strap-feed circuits. Toothed feed wheels, connected to the shafts of the air motors, feed the straps through band tracks and around the package. At the end of the band track each strap trips a limit switch which cuts off the air motor, stopping the strap feed. Strap is then fed into the upper platen by hand.

Applying Strap Tension

Next, the platen is lowered and the package compressed. When the strap tension button is operated, the air motors operate in the reverse direction, tightening the strap around the package. Straps are now ready to be sealed and cut from the coil. Solenoid valves are again used to actuate the pneumatic air cylinders that provide pressure for sealing. Each sealing mechanism

UP TO 2500 pounds of compression is applied to the package by the press cylinders. Three individually controlled air motors feed the metal strap and three cylinders power the sealing operation.



contains a cutting knife that cuts the strap from the coil before it has been sealed.

When the upper platen is raised, another solenoid valve operating through a relay in the platen raising circuit, directs air pressure to an ejection cylinder, ejecting the straps from the platen. This completes the strapping cycle and sets up the machine for the next operation.

Developed to strap packages from 12 to 54 inches in height, up to 50 inches in width and of unlimited length, the machine is an excellent example of the application of compressed air to reduce operator fatigue and cut operating costs.

Electrical Circuit Operation

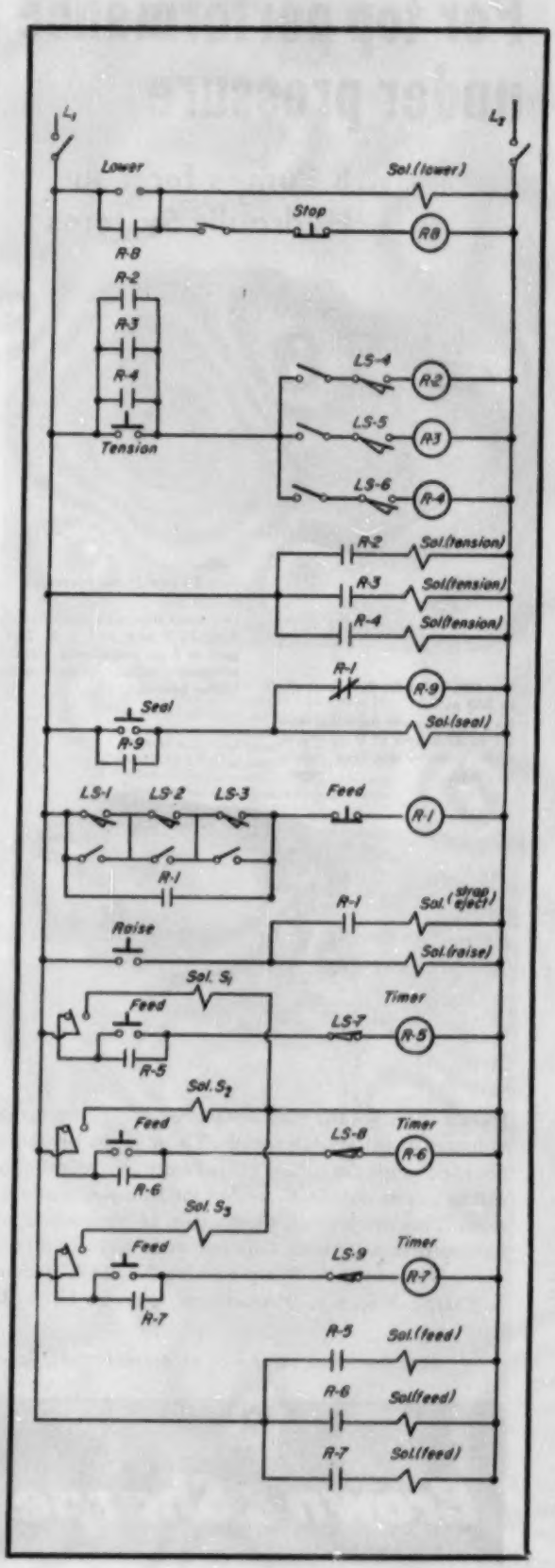
Strap feed and seal circuits are independent so that a package may be tied with one, two or three straps. Assuming a package requiring three straps is in the machine and all toggle switches are closed, all three feed buttons would first be pressed to energize timing relays 5, 6, and 7. Contacts 5, 6, 7 close to interlock the feed buttons and energize the feed solenoid valves. When the bands hit the end of the feed track, limit switches 7, 8, and 9 open to deenergize the timer relays and feed solenoids. Timer relays are used as a safety device which will deenergize the feed valves at the end of a time interval if the limit switches have not been opened.

With the straps fed in, the operator presses the platen lower button, energizing relay R-8 and the valve solenoid to compress the package.

Next, the tension button is depressed to energize relays R-2, R-3 and R-4 which close contacts to energize the tension solenoids. In order for the tension circuit to be completed LS-4, LS-5 and LS-6 must be closed. These switches are held closed by levers on the retracted sealer cylinders.

To cut off and seal the strap, toggle switches must be thrown to energize the two-way solenoid valves S_1, S_2, and S_3 at each seal cylinder. Movement of these toggle switches also prevents operation of the feed circuits at this time. The seal button is pressed energizing relay R-9 and the solenoid on the two position, four-way seal valve. As the seal cylinders move forward, LS-4, LS-5 and LS-6 open to deenergize the tension solenoids; cut-off knives operate and sealing is completed. Sealer levers at the forward end of the stroke close LS-1, LS-2 and LS-3 to energize relay R-1 which opens a pair of contacts to deenergize the seal solenoid. The raise button is pressed to lift the platen, release the package, and eject the straps. Depressing the feed button for the next cycle will deenergize relay R-1.

Use of toggle switches prevents accidental operation by inadvertant push button or limit switch operation when the machine is idle.



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A New Approach to the Design of Central Hydraulic Systems

Concluded from page 75

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3. Positive separation of gas and fluid will reduce pressure losses in the system due to gas absorption in the fluid.
4. Better control of pumping equipment through loading and unloading at less frequent intervals with consequent power and maintenance savings.

Earlier in this discussion it was pointed out that most of the liquid volume is furnished by the low pressure system and that a wide variation of pressure is not usually objectionable in this type of system since this variation does not appreciably affect closing or opening speeds *providing* piping and valving is of adequate size. A low pressure central system containing the same elements as shown in Figure 3 is usually satisfactory. Where the high pressure accumulator bottle may have a capacity of 120 gal., as in the example, the low pressure equivalent will probably be 1000 gal. or more.

Filters Can Reduce Expense

It is to be regretted that more central systems are not taking advantage of the lubricity and corrosion inhibiting characteristics of water containing a 3 to 5 percent solution of water soluble oil. Some plants are still dumping water to sewers in spite of high water bills and increasing maintenance costs. Many closed systems using water soluble oil neglect installing liquid filters. A 60 to 80 mesh cloth screen filter of ample surface area is easy to maintain and may save considerable expense in other parts of the system. A good location for filters is between the return tank and the pump suctions.

There is a growing demand in the plastic and rubber industries for higher available press tonnage for certain products. In the past several months we have installed several 3000 to 4500 psi systems in plants where we had previously installed 250 psi and 2000 psi systems of the type shown in Figure 3. In each case we have used individual accumulators on each press for the new system. In each case we provided the adjustable pressure feature for some of the presses as shown in Figure 2, while the presses which did not require adjustable pressure were hooked up as shown in Figure 1. Comparing the cost of the new installation with that of the conventional systems previously installed and considering the new flexibility, leads us to believe that the new system is superior in every respect.

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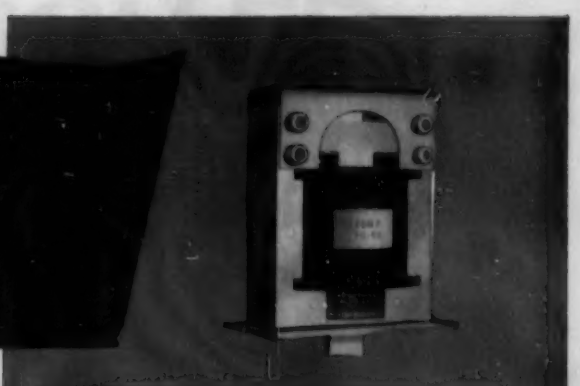
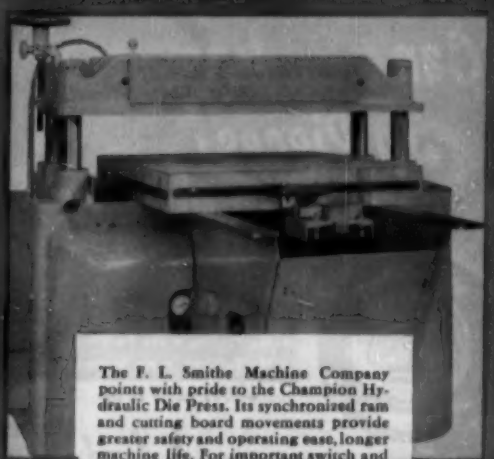
Engineering BULLETIN EM-52 gives details on standard Namco Solenoids.





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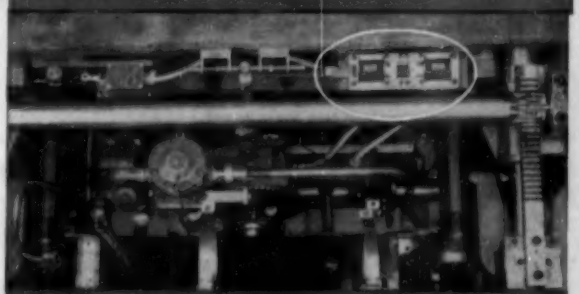

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Bonded Seals

Concluded from page 71

heads of the bolts which secure the various members of the internal wing structure, part of which are shown in Figure 6.

Contrary to general "O" ring and similar seal practice, a general synthetic compound has been developed that takes care of fuel oils and hydraulic fluids over a very broad range of temperature (–65 to 250 F). Nonflammable fluids have not been tested.

When used in conjunction with light alloy components, one of the best features of this type of sealing washer is its ability to handle high pressure without excessive tightening. Other forms of seal usually need to be tightened down hard to prevent leakage, with consequent risks of distortion of components and stripping of threads. A particularly effective proof of this was demonstrated recently at the British Industries Fair. A bonded seal was located between two surfaces which were drawn together by a knurled screw. This screw could be tightened by hand alone to seal effectively no less than 6000 psi.

Though developed primarily for aircraft hydraulics, the bonded seal has become popular in many other industries. In many cases such as mining equipment, automotive and marine engineering, the bonded seal is used to keep fluids and gases in the systems or components. Conversely, these seals are equally effective for excluding water from radio, radar or similar equipment operating either in exposed places or in a fluid. The bonded seal is proving its effectiveness and convenience in an ever widening range of applications.

An English development, the bonded seal is now being produced in America under license. Modifications and refinements not mentioned in the article have been made to adapt this type of seal to American manufacturing methods.

Tank Recovery Design

Concluded from page 84

would have been needed to reverse the fluid motors.

Reliability of the hydraulic circuit is the result of careful circuit layout to minimize piping and proper selection of components. The hydraulic circuit drawing illustrates the simplicity of control. Pressure control on each winch is obtained from the pilot valves which are piped to the vent connections on the pressure control (relief) valves.

Brakes on the winches are controlled by single action cylinders. Because spring pressure acts to hold the brakes, the brakes will go on if oil pressure is purposely or inadvertently removed.

Space limitations and high torque requirements have been met by using a 2000 psi hydraulic system. The principles applied here have unlimited possibilities for application in materials handling and earth moving equipment.

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MOISTURE and PRESSURE CONTROL in a high pressure pneumatic circuit

By J. L. Dooley and H. D. Samuel

This article describes the design of an automatic pneumatically actuated control package which attaches to a 3000 psi airborne air compressor. The unit controls the pressure and moisture content of the high pressure air delivered from the compressor.

IN recognition of the space restrictions in modern military aircraft, this design combines in one small package, Figure 1, all of the required compressor automatic controls. The following functions are performed:

1. Moisture is separated from the compressed air.
2. The condensate is dumped and the compressor stages are unloaded when the compressor shuts down.
3. A check valve prevents the compressed air from leaking back into the compressor.
4. A pressure switch shuts off the compressor when the delivery pressure rises to 3000 psi and starts it again when the reservoir pressure drops to 2750 psi.
5. A relief valve prevents the system pressure from exceeding 3500 psi.

Figure 2 is a schematic cross-section of the package tracing the path of the compressed air through the unit, and illustrating the location and method of operation of the various components. The air, highly compressed and partially cooled, enters the condensate chamber where it is further cooled, forced into a

J. L. DOOLEY and H. D. SAMUEL, Rhodes Lewis Company, Los Angeles, Calif.

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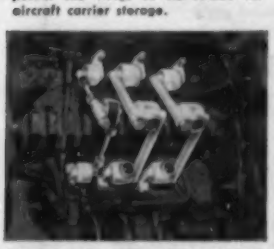

When wings are in the horizontal position, the joints form solid lines carrying hydraulic fluids.

Chiksan assemblies provide a fixed arc of travel, allowing a compact grouping of duplicate sets of lines.

Chiksan aero-hydraulic swivel joints and assemblies convey hydraulic power through the complicated folding wing area of this sleek navy fighter. Flexible as rubber with the strength of steel, these swivel joints flex in a predetermined arc, avoiding the possibility of entangling lines.

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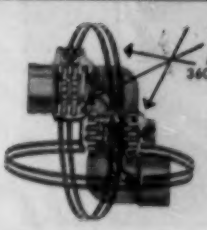

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Moisture and Pressure Control

rotary path and its velocity is reduced. This combination of conditions condenses more than 99 percent of the air's original moisture content. This condensate collects at the bottom of the chamber. The dry air exits through the tube at the top of the chamber, passes through the spring loaded check valve, and proceeds through an external tube to the high pressure receiver. As the pressure beyond the check valve increases, the nylon poppet and metal stem rise against the spring loaded switch actuating plunger until at 3000 psi the electrical contact is broken and the compressor is shut down. When the reservoir pressure drops to 2750 psi, the electrical contact is closed and the compressor begins operation again.

Expelling the Condensate

Under operating conditions, the relatively low pressure in the compressor's second stage is communicated to the under side of the rubber diaphragm located beneath the condensate chamber. The resultant force is sufficient to seal the condensate dump valve. When the compressor is shut down, the second stage pressure decreases rapidly to ambient, the valve opens, the condensate is expelled, and the compressor interstages are unloaded. This permits the compressor to start up under no load conditions.

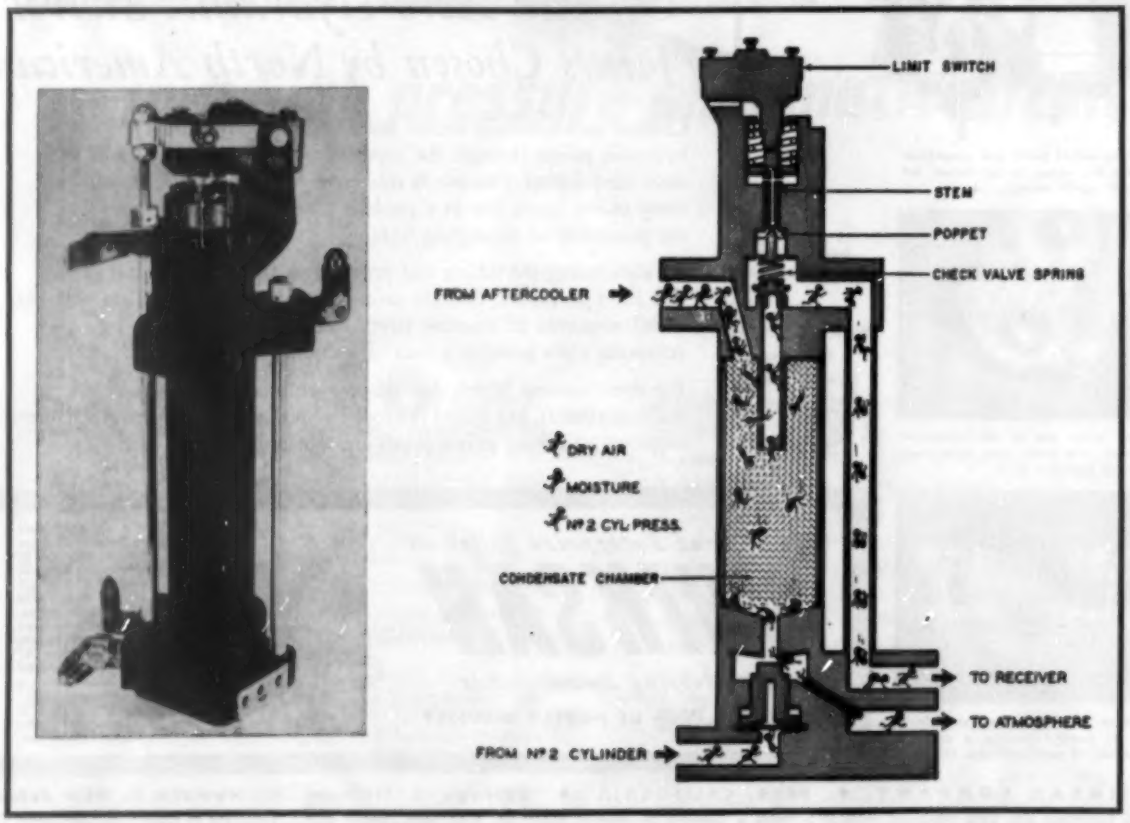
If for any reason the reservoir pressure increases to 3500 psi, the metal stem and the nylon poppet rise until the poppet's shoulders contact the housing. The poppet is then restrained from further motion but the stem continues to rise, exposing its small axial escape hole. This relieves the excessive pressure to ambient.

This package contains no radically new features. The total design derives its uniqueness from the manner in which it combines several reliable conventional designs in one small package. The arrangement selected permitted many of the parts to perform more than one function. For example:

1. The top casting provides:
   a. An inlet to and an outlet from the condensate chamber for the compressed air.
   b. A top seal for the condensate chamber.
   c. A housing for the check valve, relief valve and pressure switch.
   d. A support for the limit switch.
2. The check valve spring also seals the relief valve by pushing the nylon poppet against the hole in the stem.
3. The poppet and stem combine the functions of

FIG. 1. ASSEMBLED control package handles up to 5 cfm on a 3000 psi pneumatic system.

FIG. 2. CROSS-SECTION of the package shows the path of the compressed air through the unit. More than 99 percent of the air's original moisture content condenses and collects at the bottom of the chamber.



The news about pneumatics is that it is on the way to becoming the actuating power of the future. Gun chargers, emergency power actuating systems and other utility power applications developed by Kidde have already proved the vast potentialities of pneumatics in the field of aviation.

Aviation engineers are finding more and more uses for pneumatic power . . . a sign that the all-pneumatics aircraft may be just over the horizon.

Yet, for all the news it's making in aviation, pneumatics certainly isn't new. More than 250 years ago, Denis Papin compressed air by power from a water wheel. And in 1849, Baron Von Rathen proposed to compress air in stages with a series of intercoolers to get 750 pounds pressure for use in locomotives. Today, a Kidde compressor the size of a table radio will deliver 3000 PSI! Think what this means where weight is a factor...

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a pressure switch and a relief valve.

4. The tube that extends from the top casting into the condensate chamber baffles air flow and also prevents discharge of the condensate into the reservoir during inverted flight.

The pressure switch and relief valve operate within ± 50 psi of their nominal ratings over a temperature range of −65 F to +165 F. This extremely consistent performance is made possible by the following design features:

1. A special paraffin "O" ring replaced the conventional AN "O" ring.
2. Solid Teflon back-up rings replaced the conventional leather back-up rings.
3. The stem surface finish was held to 4 microinches rms.
4. The "O" ring squeeze was reduced to the minimum possible without leakage (about .015 inches less than recommended).
5. The nylon poppet was injection molded for optimum accuracy, stability, and physical characteristics. The poppet and seat configuration was selected to obtain the most effective sealing for the existing operating conditions.

The unloader at the bottom of the package features:

1. A Fairprene impregnated cloth diaphragm which remains flexible at −65 F.
2. A nylon valve seat design which assures adequate sealing over the entire range of operating pressures and temperatures.
3. A dump action of the valve which assures rapid expulsion of the condensate to avoid fouled passages.

The combination of all these features in one unit capable of handling up to 5 cfm, resulted in a package smaller than 9 in x 2 in x 3 in, and lighter than 1½ pounds, less than the size and weight of some moisture separators alone.

High Temperature Seal Symposium

SAE AE-1, Joint Aircraft Engine and Accessory Installation Committee, will conduct a Symposium on Aircraft High Temperature Static Seals for all media on Tuesday and Wednesday, May 18 and 19 at the Statler Hotel, Cleveland.

B. R. Teree, chairman of the five man panel appointed by R. F. Schwarzwalder, AE-1 Committee chairman, states that the Symposium will hear a total of 11 specialists. The range of papers and discussion is expected to cover representative research programs, design and performance data on packing materials at temperatures of 250 to 1500 F. All fluids, including synthetic hydraulic fluids, fuels and air at pressure ranges anticipated in airborne circuits, will be discussed in relation to the performance of packing materials.

Attendance will be limited to technical personnel and by invitation only. Those with direct interest in high temperature static sealing problems are asked to write Mr. Teree, The Weatherhead Company, 300 E. 131 St., Cleveland 8, O.

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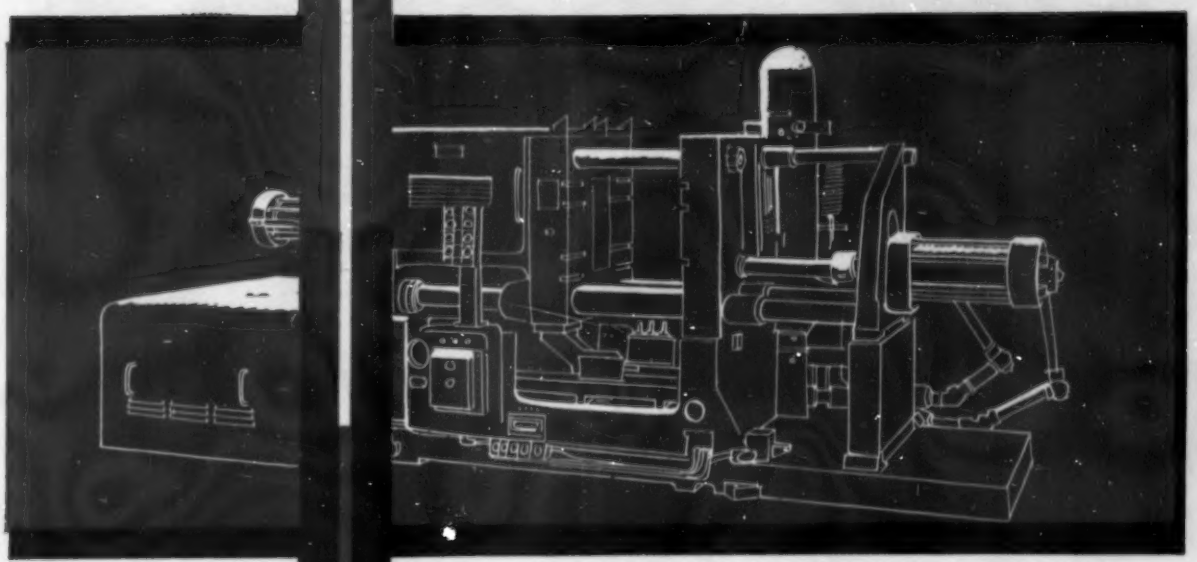

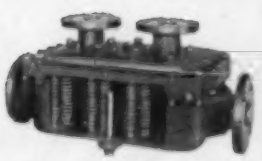

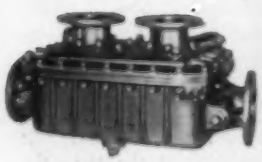

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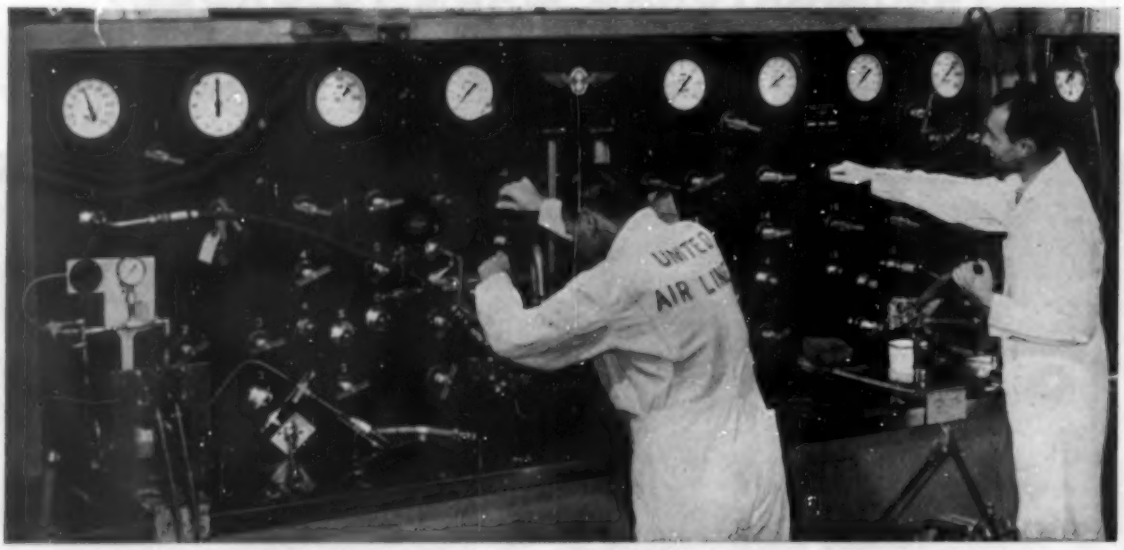

Standardizing Test Equipment

By Julius Kendall

AIRCRAFT operated by the airlines today are considerably more complex than the types in use prior to World War II. As a result, larger shops, more precise machine tools, specialized test stands and highly skilled mechanics are required to keep these planes at maximum utility. With airlines operating over larger geographical areas on a more accurate time table, one or more overhaul shops are required to handle the work load to minimize "down time". Flight time affects all components and determines the maintenance and overhaul periods.

With a large variety of accessories, usually in excess of several hundred, found on all types of planes, considerable thought must be given by engineers to simplify and standardize the maintenance and overhaul procedures for these accessories. This is necessary so that the same results can be obtained for the same type of accessory regardless of where or by whom the work is accomplished.

The establishment of a standard overhaul procedure prepared by a proprietary, airframe or engine manufacturer, furthers such a goal and insures that the component is properly disassembled, reworked, reassembled and tested. Service departments of the component manufacturers usually develop a recommended spare parts list suggesting replacement parts to facilitate repairs. This assists the operator by making it possible to have the parts available at the time the work is accomplished and eliminate delays incident to

JULIUS KENDALL, vice president in charge of sales, Greer Hydraulics, Inc., Brooklyn, N. Y.

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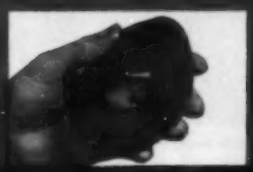

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procurement of parts after the components have been disassembled and examined by qualified mechanics and inspectors. The availability of spare parts reduces the necessity of having a higher percentage of expensive spares available to keep airline schedules.

While this procedure is excellent, it can only be carried out to a proper conclusion if the test procedures and the test machines have also been standardized.

The standardization of test stands, particularly for airline use, can very easily be accomplished for most accessories. Each airline in general operates the same types of aircraft, e.g., American Airlines operates Douglas DC-6 series, CV-240 and CV-340 series; TWA

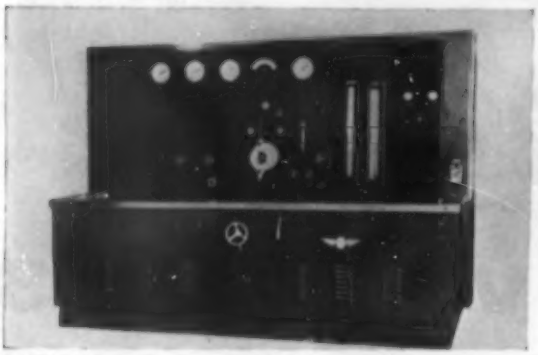


FIG. 1. A STANDARD UNIVERSAL hydraulic pump test stand. This unit tests all pumps rated up to 30 gpm and 3400 psi pressure.

operates Constellations and Martin 340's; United operates DC-6 series, Convair 340's; Eastern operates Constellations, DC-4 and Martin 340's.

The systems and their related components of these aircraft have a great deal in common. These similarities are taken into consideration in the development and design of standard universal type test stands for airline and commercial overhaul facilities.

For example, in the design of a standard universal hydraulic pump test stand, a survey was made of all the aircraft commercially operated. A tabulation of the hydraulic pumps used on these aircraft was made noting the following:

(1) capacity
(2) pressure range
(3) speed range
(4) suction characteristics
(5) temperature range
(6) size of inlet and outlet ports
(7) relative location of ports
(8) special peculiarities

On the basis of the information obtained, the horsepower requirements and speed range were readily determined, as well as instrumentation and controls. Figure 1 is an example of this type of test stand.

This test machine is equipped with sufficient horsepower to handle the majority of pumps employed on the basic aircraft hydraulic systems with the exception of the high horsepower hydraulic pump used to drive

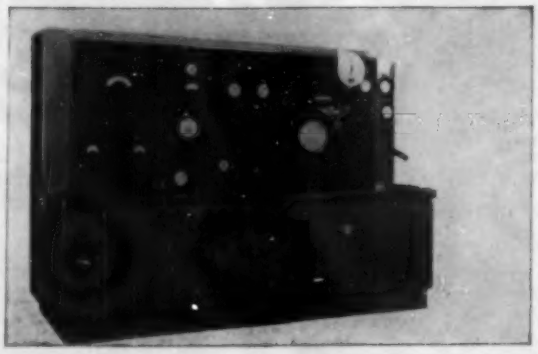


FIG. 2. THE USE OF this integral oil control green run and components test stand by manufacturer and overhaul facilities gives repetive check test results with a single training procedure and one set of operating instructions.

the supercharger. A special high horsepower unit was developed for this purpose.

Since most operators have a space problem, they are keenly aware of the space requirements of test stands. Whenever possible, universal types of test stands, on which more than one type of accessory can be tested, are sought. This procedure is also of prime importance to the Naval Air Force and the U.S. Air Force, whose organizations have multiple overhaul facilities strategically located throughout the United States and outside the continental limits. Standardized test procedures and test equipment are essential to schedule overhauls, requisition spares and spare parts, determine manpower and achieve maximum utilization of the military and naval aircraft.

The airline operators, overhaul shops and privately operated aircraft owners are similarly faced with this problem, the overhaul and test of repaired components to obtain maximum operation, i.e., the greatest possible number of flying hours. Air freight and nonscheduled operators are particularly concerned since they operate throughout the world, in and out of airports, sometimes on regular schedules, but more often on a nonschedule basis. Their livelihood depends on the maximum utility and efficiency of their aircraft.

Good test design should embody the following:

(1) Straightforward circuitry to accomplish the desired result
(2) Arrangement of control panels and instruments within easy reach of the operator
(3) Clear marking of function of all instrumentation and controls
(4) Arrangement of all components for easy maintenance or replacement when necessary
(5) Adequate protective devices to prevent accidents to operator, and shut-off devices to protect stands and parts
(6) Ready accessibility of external service connections (electrical, air, water) for maintenance personnel
(7) Size of unit kept to overall minimum
(8) Dimensions of test stand to be such for ease of transport, movement within plant and to work and readily installed
(9) Adequate safeguards for mechanical protection of components under test (filtration, relief valves, etc.)

The goal of providing standard designed, precision built test stands appeared a distant one at the time of the outbreak of World War II. Constant coordination among airframe, engine and accessory manufacturers who designed and built test equipment to meet requirements for testing all types of components and systems has permitted the industry to approach this goal.

Of prime importance is the assurance that the tests performed to the same specifications provide the same correlated results. American carriers operating outside the United States and foreign carriers operating at our bases have learned that their planes, engines and accessories can be overhauled and tested with complete confidence with results identical to tests in their home bases.

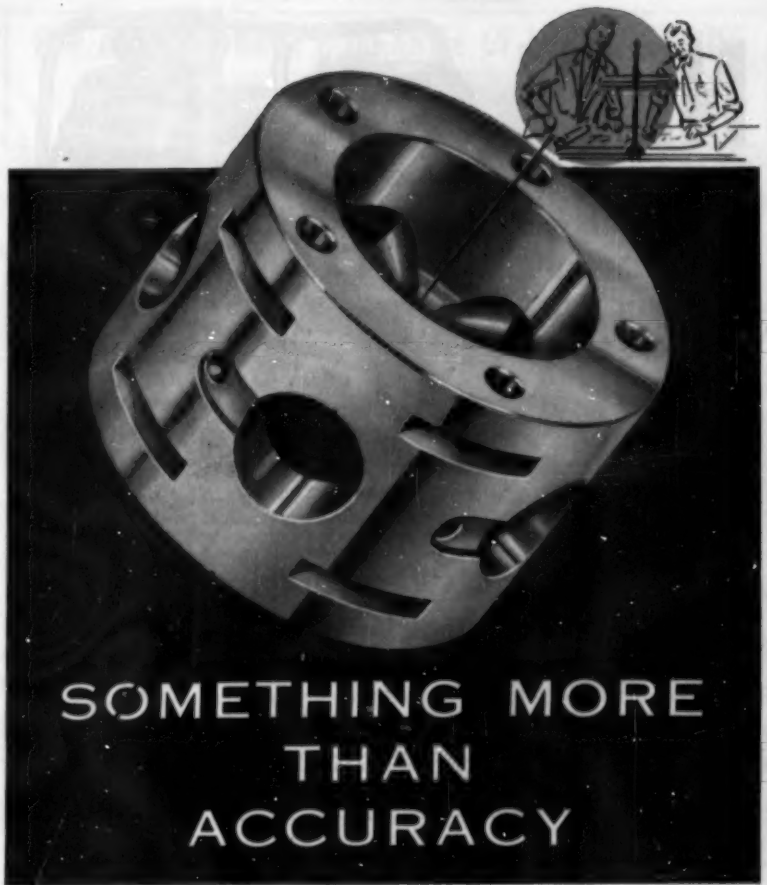
Uniform Test Results

The economy of a single source of engineering, minimizing the duplication of design, insures uniform test results at both design and production stages. This is a real advantage to both operator and the accessory manufacturer. An important result has been a lower cost which has been passed along to all users.

Another advantage of standardized test equipment is that the normal maintenance and service personnel in any overhaul base can use such test stands. Identical test stands are used by airframe, engine and accessory manufacturers and by all training schools.

A typical example of standardization is the development of a test stand designed in cooperation with Hamilton Standard Division of United Aircraft. This stand, an Integral Oil Control Test Stand, is used by the manufacturer and the overhaul facilities as well as by all of the manufacturers' licensees. The test results indicate excellent correlation, minimum service problems, single training procedure and one set of operating instructions. Figure 2 shows this stand.

Test equipment must be versatile, accurate, efficient and provide maintenance-free operation. It must be remembered that the items being tested are usually expensive, and that test stands that must determine the evaluation are, of necessity,



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Test Stands

often comparably higher in first cost of development.

Such tests must be capable of continuous operation, month after month and provide the same repetitive answers regardless of who operates the stand. At the same time, new test equipment and procedures must keep abreast of new accessories as they are developed and made available to service, airline and other users without delay.

Specialized Design Field

Component manufacturers are often anxious to utilize their own facilities and skills in their own productive fields for which they are best suited and leave test stand manufacturing to test stand specialists. The design and fabrication of test equipment is a specialized industry which has become recognized as essential in production, quality control and overhaul.

A procedure that has proven effective is to invite the test stand manufacturers, at the inception of the design of the accessory, engine, etc., to assist in the determination of the requirements of the test equipment so that the fabrication of the test stand will parallel the design of the component. Such a test stand is usually needed by the manufacturer himself to test the item being developed, in order that the results for qualification can be obtained rapidly and then can be used in determining the desired production test procedures.

In many instances, the basic component, designed by an engine or airframe manufacturer, will be built by an outside vendor. This means that the test stand used by the vendor must be capable of correlation with the prime manufacturer. The circuitry, instrumentation and performance must be comparable. The basic engineering accomplished for the original qualification test stand has been used for the quality control inspection department at the prime manufacturer, the vendor and finally at the overhaul activity.

If each step, qualification through overhaul, required separate complete engineering, test stands developed in each step would be more costly, the possibility of correlated

results would be less and the necessity for trained engineers at each step would be greater.

Jet Aircraft Requirements

It has been necessary to develop special test stands for proprietary accessories used in a single application. This type of stand will also be available to the overhaul shop when needed. Highly specialized individual stands of this type for jet engine accessories are in use. Jet engine components require, as a rule, higher horsepower prime mover than for reciprocating engines, multiple pad gear increases, a more accurate speed regulation, more accurate instrumentation and considerably more care in panel layout to minimize operator fatigue, since the test time may be as long as 6-8 hours for some units.

Reprints of the 32 page circuit section which appeared in January are available. Single copies 50c; 40c in lots over 50; 35c in lots over 100.

The experience gained in the design of these test stands for the prime manufacturer for his own use in qualification and quality control and for use in overhaul by the services, will definitely assist in making the same type of equipment available to the airline operators and commercial overhaul facilities in the next several years at economical cost. This is becoming more necessary as jet engine powered aircraft become more readily adopted for airline operation.

It is quite clear that standardization of aircraft maintenance and test equipment makes economic sense. Test-wise, it takes advantage of the cost-savings of mass production. Maintenance-wise, it means the wide utility of standard equipment, uniform results and a lowering of training and personnel costs. That such standardization can be achieved has been demonstrated. The high dividend of the close liaison among the manufacturer of aircraft, engines and accessories and the designer of test equipment cannot be ignored.

This article has been prepared from a paper presented by Mr. Kendall at the National Conference on Industrial Hydraulics, October 1953.

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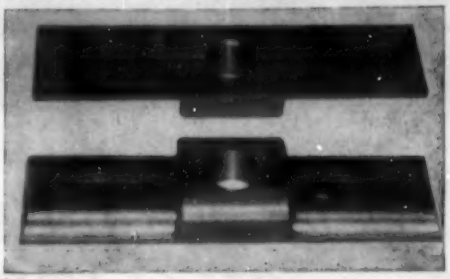

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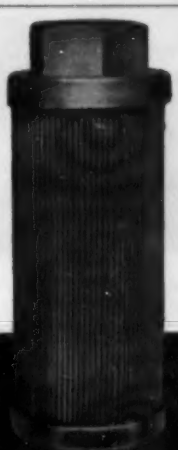

The New
CAPITAL HYDRAULIC OIL FILTER
WITH MONEL METAL INSERT
Reservoir Type for Hydraulic and Oil Re-Circulating Machinery
EASY TO INSTALL • EASY TO CLEAN • LONG LIFE • LOW COST
SIZES AND SCREENS TO FIT YOUR NEEDS

CAPITAL ENGINEERING & MFG. CORP.
5837 South Ashland Avenue — Chicago 36, Illinois

ONE OF A SERIES

You Get Many Benefits by Specifying VICKERS Hydraulics

Long-Established QUALITY

Certain names and designations have become synonymous with long-established quality in consumer products. Some that you will recognize are Sterling, Sheffield, Wedgwood, etc. Similarly, certain names signify long-established quality in industrial products . . . you can think of many with little difficulty.

Among the latter is VICKERS, . . . for long-established quality in Hydraulics. For more than a quarter century, the mark VICKERS, has signified superior products and services . . . with continuous pioneering in hydraulics research and development. As a result, the list of leading manufacturers who use Vickers Hydraulics continues to grow. You also can get the benefits of this dependable, long-established quality by specifying Vickers Oil Hydraulic Equipment.

VICKERS
Incorporated
DIVISION OF THE SPERRY CORPORATION
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Application Engineering Offices:
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6396

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

NEW PRODUCTS

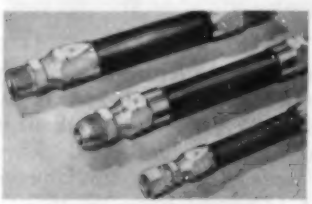
Components, tools and equipment designed to improve operation of fluid power systems are described here . . . for more information fill in and mail the post card bound in this issue.

Continued from page 55

HYDRAULIC HOSE COUPLINGS

. . . line is expanded

Features: Addition of 13 sizes of industrial hose couplings elimi-



nates the need for reducers in many combination size connections when diameter reduction from hose to tubing is desired. Availability of more sizes minimizes design problems. The reuseability feature means convenient installation of hydraulic hose lines. The new additions conform to SAE hose fitting standards and applicable specifications of JIC hydraulic standards.

Applications: Hose fittings for low, medium and high pressure installations include swivel nut fittings, male pipe thread fittings, flare hose fittings and the component sockets, swivel nut nipples, male pipe thread nipples and flare hose nipples.

The Parker Appliance Company, Cleveland 2, Ohio

Circle 234 on Reader Service Card

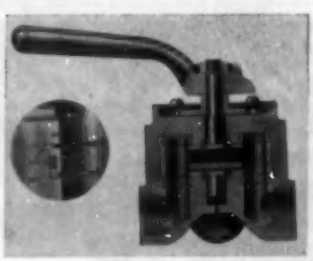
SELECTOR VALVE

. . . handles pressures to 6000 psi

Sizes: ⅜ to 1 in for 0-2000 psi; ⅛ to 1 in for 0-6000 psi.

Construction: "Balanced" selector valve for pressures up to 6000 psi. The valve consists of a body ported as desired, which encases a disk having internal flow passages. As the disk is revolved to produce flow through the ports, sealing rings take effect and eliminate cross leakage within the valve.

Features: Fluid reaches both sides of the rotary disk causing it to float in its chamber, eliminating directional pressure and the need for thrust bearings. Sealing rings are designed with a larger area on the bottom of the seal than on the surface toward



the disk, thus positive contact of the seal is assured, regardless of flow direction or pressure. Back pressure will not unseat the seals.

Republic Manufacturing Company, Cleveland 2, Ohio

Circle 235 on Reader Service Card

HYDRA SPRINGS

. . . adjustable to loads

Design: Two new high capacity hydra springs provide respectively for 6000 and 8500 lb force in a relatively small space. This performance is the result of utilizing the compressibility of special fluids called Wales Comproils. These springs measure only 2¼ in diameter by 4¼ in long. This feature simplifies

spring applications. Force and stroke of the springs may be adjusted by changing preloads or volume or types of special fluids.

Applications: Springs provide quick installation because they are compact, self-contained, preloaded and may be dampened and adjusted on place. They eliminate drilling, and spring pads required by coil springs.

Hydra Spring Division, Wales-Strippit Corp., North Tonawanda, New York

Circle 236 on Reader Service Card

INTERNAL THREAD COMPARATOR

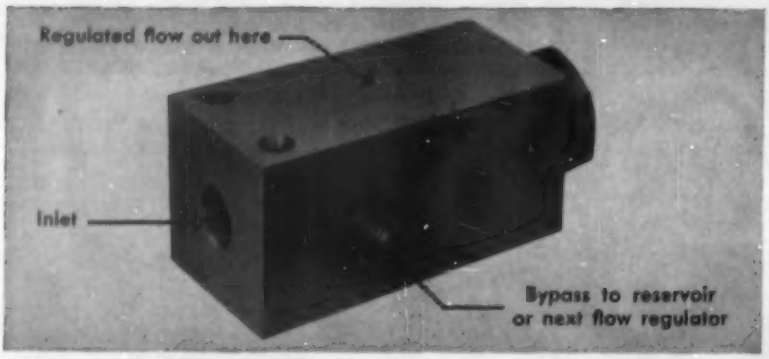
. . . designed for visual gaging

Designation: Internal thread comparator

Design: All classes of fit, American standard or unified threads, can be checked with a simple adjustment of the indicator tolerance hands. The need is eliminated for maintaining 3 or 4 no-go thread plug gages for each thread size. One thread segment

Circle 49 on Reader Service Card

Add A Regulated Circuit Without Adding Another Pump



NEW FLOW REGULATOR—Bypass & Restrictive Type

- Provides Constant Flow in Regulated Circuit
- Use bypass flow for other circuits
- Can be used in series to control two or more flows
- For all 100 to 3000 P.S.I.
- Regulated flow ¼ G.P.M. to 6 G.P.M. non-adjustable; specify flow desired
- ¼" and ⅜" pipe sizes

Write for detailed engineering data and prices

Manufacturers of Hydraulic Valves and Devices

Fluid Controls, inc.

Relief Valves • Check Valves • Restrictor Valves
Needle Valves • Pilot Check Valves • Clamping Valves
Small Spring Loaded Accumulators • Special Valves

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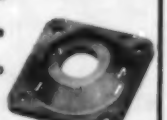
ALLENAIR Cylinders

HIGH QUALITY IN THE LOW PRICE FIELD!

DOUBLE ACTING FOR:
AIR 150 P.S.I. • **WATER**
L.P. HYDRAULIC 350 P.S.I.

CLEVIS MOUNT

ROD CLEVIS


FLANGE MOUNT

FOOT MOUNT

COMPARE THESE OUTSTANDING FEATURES:

- Rectangular section, hardened, steel snap rings, ground to .001 tolerance on thickness, secure heads squarely and rigidly.
- Leather back-up rings, for rod sealing rings, in all the heads.
- Honed brass cylinders "Copper-Brited" for resistance to corrosion.
- Ground and Polished Stainless Steel rods.
- Thomson Nylined bearings.
- Adjustable rear and front cushions available.

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The A. K. ALLEN CO.
57 MESEROLE AVE., BROOKLYN 22, N. Y.
AGENTS IN PRINCIPAL CITIES

New Products

Continued

is collapsible permitting fast loading. Exclusive ball bearing, single slide design feature insures maintained accuracy over long service life. Easily removable thread segments permit in-

terchangeability and fast setup.

Features: Precision instrument, designed for fast, accurate visual gaging of all forms and classes of internal threads, in diameters ranging from ⅜ to 1½ in.

Applications: Inspection tool indicator tells at a glance whether parts are oversize, undersize, tapered or if accumulated lead and angle error are within established tolerances.

Hanson-Whitney Company
Hartford 2, Conn.
Circle 237 on Reader Service Card

LONG RANGE PULSE TIMER . . . has accurate pre-set intervals

Operation: A unique arrangement of cams rotating at different speeds provides accurate

momentary pulses even when spaced considerably apart in respect to time. Such pulses will occur regularly at factory pre-

set intervals. The frequency of pulses is altered by changing gears and may be set from 1 pulse every 15 seconds to 1 pulse per week. The time between pulses can be up to 30 times greater on this unit than on a conventional timer having cams anchored directly to motor shaft without loss of rapidity of "make" and "break" contact action, diminutiveness of pulse and accuracy of pulse.

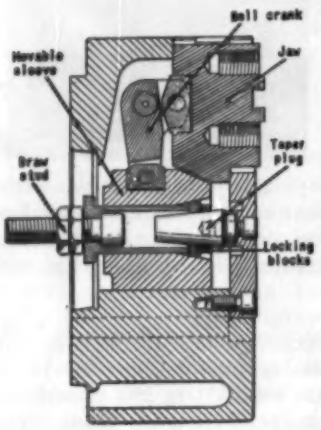
Hagen Manufacturing Company, Inc., Subsidiary of Eagle Signal Corp., Moline, Illinois

Circle 238 on Reader Service Card

LOCKING CHUCK
. . . released only by operator

Designation: P.R.O. (Power release only)

Construction: The sleeve is moved by the draw stud which



acts through a set of locking blocks. These locking blocks are inserted in holes in a small inner sleeve and engage an internal taper on the movable sleeve. The locking action is produced by the wedging of these blocks against a tapered plug placed inside the movable sleeve. The tapered plug is one-half that of a movable sleeve so that the blocks are wedged until they are positively released by the draw stud. The tapers are calculated to produce a constant bearing with the blocks for the entire movement of the inner sleeve. When the chuck is in a gripping position, the blocks are initially in paral-

Keeping hydraulic and lubricating oils free from impurities can be a costly process — one demanding the frequent draining and refilling of entire oil systems. But with the GENERAL AF-500's positive absorption . . . moisture, dirt, rust, tars and lint are *safely trapped* in the finest wool felt, assuring trouble-free, uninterrupted operation of oil systems for as long as a year! Machine parts are protected from abrasive wear and maintenance costs are reduced on both new and old equipment.

No other Filter like it!

TWO-FOLD ELEMENT

The AF-500 actually works two ways — its ALL-WOOL felt element traps *moisture* and dirt particles as fine as *5 microns.*

CLEAN, SAFE LIQUIDS

Clean, completely dependable oils, paints, lacquers and other industrial liquids are assured at 15-20 gpm, depending on viscosity.

LONGER MACHINE LIFE

Both on new and old equipment, GENERALS protect vital machine parts from abrasive wear, greatly prolonging service life.

SIMPLE DISASSEMBLY

Cleanable wool felt cartridge can be quickly removed and washed in any suitable solvent without disturbing inlet or outlet lines. Merely unscrew center bolt, lift off cover and two washers, and remove felt cartridge intact.

WRITE us — without obligation — about your industrial filtering problems.

GENERAL FILTERS, INC.

43800 GRAND RIVER AVENUE • NOVI, MICHIGAN
CANADIAN GENERAL FILTERS, LTD., 2679 DANFORTH AVENUE
TORONTO 13, ONTARIO

Circle 57 on Reader Service Card

HUSCO®

PUMPS
VALVES
CYLINDERS

"Husco" manufactures many standard and special hydraulic control units which include:

Hydraulic Cylinders—all types
Control Valves—capacities to 30 GPM—3000 PSI
Lever Operated Check Valves
Reciprocating Valves
Rotating Swivels
Check Valves
Package Power Units

"HUSCO" CUSTOM BUILT HYDRAULIC CYLINDERS

Complete lines of single-acting and double-acting cylinders, differential type, as well as telescoping cylinders, are available. All cylinders are built to customer application requirements. "HUSCO" cylinders are:

(1) Designed to insure concentricity of guides which are piloted from the same diameter

(2) Adequately guided to prevent any bearing load against the packings—insuring full life of packings and safe-guarding against leakage

(3) Provided with an adjust nut for take up on the packings

"HUSCO" welcomes the opportunity to provide engineering assistance on hydraulic problems and in developing new hydraulic equipment

Used on:
Construction, Industrial, Material Handling and Agricultural Equipment

HYDRAULIC UNIT SPECIALTIES CO.
Pumps • Valves • Cylinders

lel contact with a movable sleeve and the plug. As the chuck revolves, the centrifugal force on the chuck jaws causes the locking blocks to rock and exert a maximum locking force.

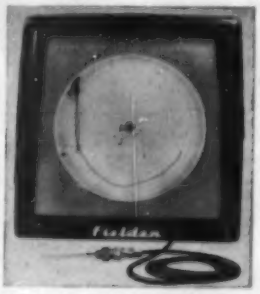
Features: Will remain locked in closed position until it is opened by the operator. Neither centrifugal force nor power failure will cause release of the work as the chuck is revolving.

The Logansport Machine Company, Logansport, Indiana

Circle 239 on Reader Service Card

INSTRUMENTS
. . . able to record and control

Design: Operating on the null-balance principle using ac signal actuation, these instruments require no batteries or standardizing circuits. An example of



simplification is the bridge components, which are contained in a single interchange unit, permitting easy range changing as well as adaptation of the recorder to an entirely different measurement whenever necessary. This bridge unit is also available with up to four inputs, permitting averaging, addition or differentiation.

Features: A range of nickel, tungsten and platinum resistance temperature detectors is available, covering temperatures of minus 200 C to plus 500 C (minus 328 F and plus 932 F). All except the platinum bulbs feature linearized chart scales. A full range of control forms, both electrical and pneumatic, is available.

Applications: Has a wide range of industrial uses for recording and control of temperature, conductivity, strain, force, position, pressure and for telemetering.

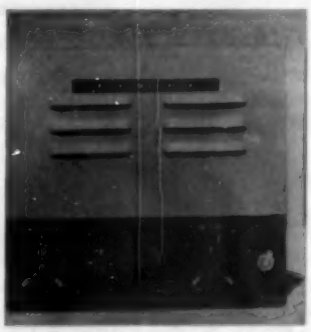
Fielden Instrument Division, Robertshaw-Fulton Controls Company, Philadelphia, Pa.

Circle 240 on Reader Service Card

ELECTRONIC TIMERS
. . . provide automatic cycling operation

Designation: Model 2, Model 3

Design: These timers utilize one radio type tube and a voltage



regulator to charge two resistance-capacitance networks. During operation, one cycle automatically initiates the next without moving parts or external operation.

Specification: Cycle electronic timers provide on-cycles ranging from .01 to 150 seconds and off-cycles ranging from .01 to 900 seconds.

Applications: Suitable for a wide range of industrial and laboratory controls where the timing device must be stable and accurate in nominal changes of line voltage and temperature.

G. C. Wilson & Co., Huntington, W. Va.

Circle 241 on Reader Service Card

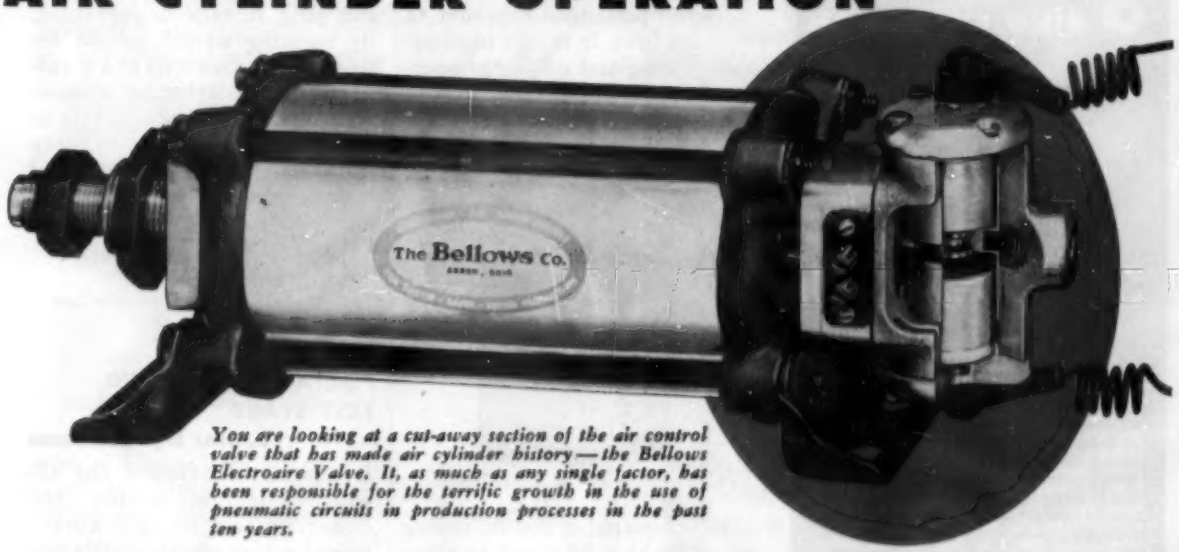
THREAD COMPOUND
. . . prevents seizing and galling

Designation: Thred-Gard

Size: ½ pt, 1 pt and 1 qt

Features: A new high temperature thread compound that protects against the welding action

THE VALVE THAT REVOLUTIONIZED AIR CYLINDER OPERATION



You are looking at a cut-away section of the air control valve that has made air cylinder history — the Bellows Electroaire Valve. It, as much as any single factor, has been responsible for the terrific growth in the use of pneumatic circuits in production processes in the past ten years.

Why? - First of all — it is a complete air control unit. Not only does it direct the high pressure air to the desired cylinder port *instantly, without lag,* but it regulates and controls the speed of the air cylinder piston.

Second - while electrically controlled, it is not electrically powered. Instead of using heavy power solenoids to shift the valve, it uses the air it controls to do the work. Two sealed solenoids, hardly bigger than a thimble, act as "triggers" to release and direct the high pressure air.

Third - the small sealed solenoids act on only 8 volts of current. There is no danger of solenoid burnout (in fact the control units are guaranteed against burnout). Wiring requirements in interlocked circuits are simple. There is no electrical hazard to either operator or machine.

Fourth - the Electroaire Valve is compact. No bigger than a package of king-size cigarettes, it fits into crowded quarters, or on moving machines.

And finally — the Electroaire Valve is durable. Over a quarter of a million are in everyday use. Records of 30,000,000, 40,000,000 even 50,000,000 cycles without repairs of any kind are common.

Of course, the Electroaire Valve is a built-in feature of all electrically-controlled Bellows Air Motors, but it is equally suitable for use with any conventional air cylinder up to bores of 4½" - 5".

WRITE FOR THESE FREE BOOKLETS

Bulletins EV-310 — and CL-50 — detailed information on the Bellows Electroaire Valve and other Bellows "Controlled-Air-Power" Devices. Address:
The Bellows Co., Akron 9, Ohio
Dept. AH 554,

In Canada: Bellows Pneumatic Devices of Canada, Ltd.
4972 Dundas St., West, Toronto 18, Ontario

The Bellows Co.

AKRON 9, OHIO

518-A

CONTROLLED-AIR-POWER FOR FASTER, SAFER, BETTER PRODUCTION

Circle 115 on Reader Service Card

PREVENT
"O" RING EXTRUSION
THE REID WAY

Teflon
BACK-UP
RINGS

This Not This

REID pioneer in chemically-inert Teflon, introduces 30° scarfing to reduce Z-gap and prevent marking or distortion of O-Ring. • Newly designed to fit BOTH piston groove diameter and rod diameter. • Many times more accurate than leather. Much lower coefficient of friction. • Non-corrosive, long-wearing, self-lubricating. • Withstands -100° F. to 500° F. • MANDREL-packed to maintain dimensional accuracy, prevent tangling. • 4 types: spiral, spiral even-cut, split, solid. • Write today.

REID RE Enterprises
Kimball 9243
3715 Santa Fe Avenue
Los Angeles 58, Calif.

New Products

Continued

of threaded connections subjected to prolonged exposure to extreme heat. It is said to eliminate seizing and galling at operating temperatures up to 1200 F.

The compound is non-hardening and acts as a lubricant to allow easy disassembly of threaded connections, even after lengthy service under the most severe conditions. Not only is dismantling time greatly reduced, but damage to stud, bolt, pipe joint and plug threads is prevented. By reducing wrench torque, fittings can be drawn up to a greater degree of tightness without undue stress or strain. It acts as a protective coating to keep threaded surfaces smooth and insures pressure tight metal to metal contact.

Crane Packing Company, Chicago 13, Illinois

Circle 242 on Reader Service Card

PORTABLE PNEUMATIC TEST STAND

. . . for high pressures

Features: Enclosed for all-weather service, welded steel construction, instant action forged valves, stainless steel tubing and fittings, blow out disks and shatterproof glass.

Specifications: Air at pressures up to 3500 psi is supplied by a 16 to 26 cu ft per min three stage

REPUBLIC
VALVES
INDUSTRIAL • CHEMICAL • AIRCRAFT

OFFSET GLOBE VALVE

J.I.C. AND AN STANDARD TUBE ENDS

High pressure needle and globe valves by Republic have forged bodies for super duty service—brass, steel, aluminum alloy, or stainless steel. Exclusive design features. Pipe, or AN or J.I.C. tube ends, or combinations, sizes ⅛" to 1". Operating range: needle—3,000 psi; globe—2,000 psi, -65° to 350°F.

Manufacturers also of high quality low and hy-pressure check valves, relief, 2, 3, and 4-way plug valves, and special valves to specifications.

Write for complete catalog and name of nearest distributor.

82

RM REPUBLIC MANUFACTURING CO.
1930 WEST 77TH STREET • CLEVELAND 2, OHIO

AIR-MITE AIR CYLINDERS
Low Cost Compact Powerful Rugged

AIR-MITE Cylinders—made in single or double acting series—in 4 mounting types, are high quality cylinders at a low price. Simple, rugged design and compact construction give them long life, permit easy mounting on jigs, fixtures, tools, or machines. Used wherever power holding, pushing, pulling or lifting is required, AIR-MITE cylinders will meet your most exacting standards of dependability and long life. Write for complete catalog and prices.

1. Ground and polished steel ram
2. Brass, true-bore cylinders
3. High strength aluminum alloy cylinder heads
4. Bronze oilless ram bushing
5. Five steel tie rods
6. Brass base stems

4 Mounting Types

AIR-MITE
4415 W. CARROLL AVENUE • CHICAGO 24, ILLINOIS

Circle 116 on Reader Service Card

Circle 4 on Reader Service Card

compressor to test complete high pressure systems or their components. On the standard unit, a selector switch will provide air at any two desired pressures. Pressure is maintained by automatic recirculation. If dry air is

required, the unit is provided with a dehumidifier which will lower the dew-point of 100 F, 100 percent relative humidity intake air to –67 F.

Applications: Proof testing high pressure receivers, piping, and valves; pressurizing oil wells, charging torpedoes; salvaging sunken ships; testing landing gear; operating air circuit breakers; and testing gun firing mechanisms.

Kahn & Company, Hartford, Conn.

Circle 243 on Reader Service Card

PROXIMITY PICK-UP . . . will indicate counting, timing, speed

Designation: Model 4900

Design: Designed as a low speed complement to Electro's Model 3010A magnetic pick-up. As a high frequency carrier operated

transducer, it works on a principle similar to the military mine detector and may be excited either by magnetic or non-magnetic metals.

Construction: This new pick-up

your best bet is

FLEX-O-TUBE

Supplied in Assemblies

Flex-O-Tube will help you determine the assembly needed or work to your own specifications. In either case, modern facilities and latest inspection techniques assure you a uniformly high quality product delivered promptly.

Supplied for Field Assembly

Flex-O-Tube hose is also supplied in bulk coils with reusable fittings for field assembly. Complete range of sizes and types.

If you use flexible hose in your product or for replacement in your plant, it will pay you to specify Flex-O-Tube. For here is a name that has stood for finest quality and dependable service for more than a quarter of a century.

In the development of new uses for flexible hose, Flex-O-Tube provides you with dependable experience in the field. When used for replacement in industrial maintenance, Flex-O-Tube provides you with a complete range of products that are easy to assemble and long on performance.

Whatever your needs, why not discuss them with the local Flex-O-Tube field engineer. You'll find there are many good reasons why industry has relied on Flex-O-Tube for miles and miles of flexible hose products.

Please send me your free ☐ aircraft catalog. ☐ industrial catalog.

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Company .....

City ..... Zone ..... State .....

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FLEX-O-TUBE

DIVISION OF MERIDAN CORP.

764 FOURTEENTH • DETROIT 16, MICHIGAN

Circle 48 on Reader Service Card

HYDRAULICS ENGINEERS Specify STRATOFLEX

★ DETACHABLE HOSE FITTINGS

★ FLEXIBLE HOSE ASSEMBLIES

STRATOFLEX Hose Fittings and Hose Assemblies are designed to give dependable service and maximum performance. Cost-minded operators in the industry recommend STRATOFLEX! Whatever your requirements in flexible hose assemblies and detachable reusable hose fittings or elbow hose fittings — specify STRATOFLEX!

★ DEPENDABLE SERVICE

★ QUALITY PRODUCTS

WRITE FOR COMPLETE INFORMATION

STRATOFLEX

STRATOFLEX, INC. FORT WORTH, TEXAS
BRANCHES: P. O. BOX 10396
ATLANTA · CHICAGO · DAYTON · HOUSTON
KANSAS CITY · LOS ANGELES · MINNEAPOLIS · NEW YORK · TULSA
In Canada:
STRATOFLEX OF CANADA, Inc., TORONTO 18, ONTARIO

system consists of a transducer connected by a ten foot cable to a control unit which contains the power supply and other electronic components. It produces a dc voltage of constant amplitude when any metallic mass is brought near the pick-up. No mechanical contact is made with the exciting metal. The dc voltage remains constant as long as the exciting metal is in close proximity to the pick-up and drops to zero when it is removed. The rise and delay time of the voltage is extremely fast thereby producing a definite snap action.

Specifications: Voltage output in excess of 4 volts, with output impedance 400 ohm cathode follower shunted by 10,000 ohms. Operates up to ⅛ in clearance between pick-up and exciting metal.

Application: With suitable auxiliary equipment, this new proximity pick-up may be used to indicate mechanical or electrical counting, linear or angular position, rate of travel, sequence timing, vibration frequency, angular or linear speed, or other functions which involve moving metal components.

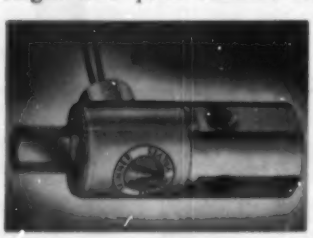
Electro Products Laboratories, Inc.
Chicago, Illinois

Circle 244 on Reader Service Card

CYLINDER SPEED INCREASED
. . . with quick exhaust feature

Designation: V5-3

Design: The quick exhaust feature increases the operating speed of small air and hydraulic cylinders by more than doubling the speed of the cylinder return stroke.



Size: The ⅛ in orifice is supplemented by a 3/32 in secondary exhaust in all models. Pressure ratings and inlet orifices are as follows: 50 psi—⅛ in; 75 psi—3/32 in; 100 psi—1/16 in; 150 psi—3/64 in. Valves can be provided with ⅛ in or ¼ NPT pipe connections.

Features: Highest quality stainless steel construction, positive sealing synthetic inserts, spring loaded design.

Skinner Electric Valve Division,
Skinner Chuck Company,
New Britain, Conn.

Circle 245 on Reader Service Card

AC INDUCTION MOTORS
. . . enclosed, fan cooled

Construction: The new models have cast iron frames and end shields. Rotors are pressure cast of aluminum, bearings grease lubricated, double shielded ball bearings, capable of relubrication without dismantling the motor. Stator windings are of the random or mush wound type.

Features: The intake openings in the end shield are of greater protection. Located in the bottom half of the end shield, these openings are high enough above the base to minimize the probability of the incoming air sweeping dust or lint from the floor or base. All continuous totally-enclosed motors, even the smallest integral horsepower sizes, are fan cooled.

Allis-Chalmers Manufacturing Company,
Milwaukee 1, Wis.

Circle 246 on Reader Service Card

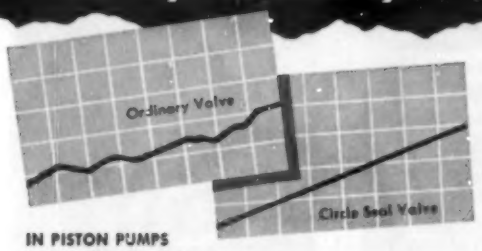
2-WAY SOLENOID VALVES
. . . for corrosive fluids

Designation: Special 8268 and 8269 Valves

Sizes: Pipe sizes are ⅜ and ½ in.

Circle 77 on Reader Service Card

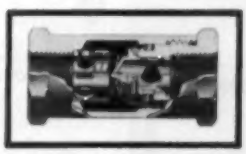
Check Valve *Leakage* Destroys Efficiency...



IN PISTON PUMPS
IN PLUNGER PUMPS

In hydraulic pumps, in chemical proportioning pumps—where constant volume must be maintained and leakage cannot be tolerated, Circle Seal Check Valves with floating "O" Ring construction provide the perfect answer because...

Circle Seal Check Valves *NEVER* Leak!



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CIRCLE SEAL *precision valves*
JAMES•POND•CLARK
2181 E. Foothill Blvd., Pasadena 8, Calif.

STORED POWER

at your Finger Tips

Bendix HYDRAULIC ACCUMULATORS

FOR INDUSTRIAL APPLICATIONS

The recognized leader in aircraft accumulator production now offers a line of accumulators for industrial use—either spherical or cylindrical—to best accommodate your space requirements.

Bendix-Pacific Industrial Accumulators, like their aircraft counterparts, furnish the optimum in performance and long life—with a minimum of maintenance. For complete information write to—

Industrial Hydraulic Section

Bendix Pacific
AGRICULTURAL HYDRAULICS
PACIFIC DIVISION • BENDIX AVIATION CORP.
NORTH HOLLYWOOD, CALIFORNIA

these great Trademarks depend on Cessna Hydraulics

JOHN DEERE
QUALITY FARM EQUIPMENT

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MODERN MACHINERY

CASE

FAMOUS trademarks come to Cessna for the best in hydraulics. *Here they find*

CREATIVE AND ENGINEERING ASSISTANCE TO SOLVE PROBLEMS IN HYDRAULICS.

SPECIALIZED PRODUCTION THAT MAKES REAL SAVINGS IN UNIT COSTS, PLUS ASSURANCE OF A DEPENDABLE SOURCE OF SUPPLY.

PRECISION MANUFACTURING, ASSEMBLING, AND TESTING THAT ASSURE LONG-LIFE PERFORMANCE UNDER ALL OPERATING CONDITIONS.

When you need specially designed hydraulic units in quantity, we invite you to *"Call on Cessna."* You'll find the best combination of experience and production facilities.

Industrial

Our "Flying" Sales Engineers are always ready to work with you in the development of hydraulic units for your equipment. Wire or write, today.

HYDRAULICS *division*
CESSNA AIRCRAFT COMPANY
HUTCHINSON, KANSAS • U.S.A.

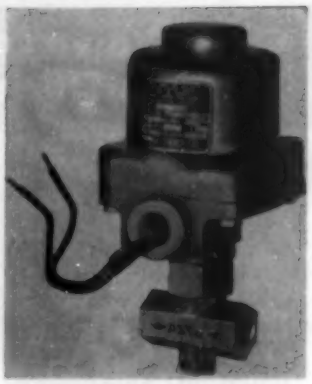
Continued

Orifice diameters range from ⅛ to ⅜ in on each size.

Design: Impact closing and opening is a design feature. Tight seating and positive closing are assured by combination of impact, gravity and the force of the closing spring. Impact opening results from the impact of a shoulder on the core interior hitting a shoulder on the top of the stem. This, plus the pull of the solenoid itself, overcomes any tendency for the valve to stick.

Operation: Valves are designed for normally closed operations. They are open when the solenoid is energized and snap-closed when it is de-energized. The latter type remains closed while energized but snap open when de-energized.

Features: Suitable for handling corrosive gasses and liquids as well as steam, all up to 450 F. The 8269 valve is equipped with an explosion proof solenoid. Bodies are either steel or stainless steel. Both valves are equipped with beveled stainless steel regrindable or replaceable



discs. Both valves are of the packless type with no sliding glands or stuffing boxes. Valves are easily disassembled for sterilizing or cleaning.

Automatic Switch Co., Orange, New Jersey

Circle 247 on Reader Service Card

"FULFLO"

VALVES

BY-PASS, OIL-RELIEF PISTON TYPE, HYDRAULIC

STANDARD AND FLANGE MODELS

NON-CHATTERING because the cylindrical piston closes off the port in a shearing manner . . . and does not seat abruptly against the body of the valve.

EXTREMELY SIMPLE Just select pressure desired from 5 springs . . . INSTALL . . . NO FURTHER ATTENTION NEEDED.

FOR machine tool hydraulic mechanism, oil-burning equipment, rams, presses and Diesel engines.

Pressures: 0 to 500 lbs.
Pipe sizes: ¼" to 2"
Bodies: cast iron or brass.
Pistons: brass, hardened or stainless steel.

WRITE—on your letterhead, please—for personal copy of

FULFLO MECHANICAL DATA BOOK. Specify if for Valves, for Pumps or for both.

"FULFLO"

THE FULFLO SPECIALTIES CO. Inc.
PUMP AND VALVE MANUFACTURERS
BLANCHESTER, OHIO

Circle 52 on Reader Service Card

AUTOMATIC LUBRICATION . . . for hydraulically powered equipment

Designation: Hydra-Lube

Application: Pumps are designed for automatic lubrication of hydraulically powered equipment, such as machine tools, presses and mining machines. They connect to the supply line of any double acting cylinder. No control valves are required because twin-sealing with vent between prevents the mixing of lubricant and hydraulic fluid. Three, five and twelve pound reservoir assemblies for grease or oil are available for use with the pump.

Trabon Engineering Corp., Cleveland, Ohio

Circle 248 on Reader Service Card

HYDRAULIC POWER PACKAGE . . . for steering systems

Designation: Series VT16 consists of a vane type hydraulic pump, flow control and overload relief valves and integral oil reservoir. Series VT17 comprises identical pump and valve units without the reservoir and is designed for installations where a separate tank is preferred.

Application: The power pack-

age is designed for use with a hydraulic steering booster to form a complete power steering system with the simplest pos-

sible installation. The unit need only be bolted on, coupled to the engine, usually by belts, and two hydraulic connections made to the booster. Overload protection is built in. Smooth steering performance is obtained with the flow control valve which insures a smooth and constant supply of oil to the booster irrespective of engine speed variations.

Features: No load starting and automatic maintenance of optimum running clearances for continued high efficiency, through use of exclusive hydraulic balance design and well known vane pump construction.

Vickers, Incorporated, Detroit 32, Mich.

Circle 249 on Reader Service Card

NEW COMPOUND . . . for "O" ring seals

Designation: Compound 1120

Features: A compound of synthetic rubber material suitable for use in "O" rings to effect sealing of aviation type fuels under pressure conditions up to 1500 psi over a temperature range of approximately +160 F to –65 F. Sealing is effected primarily due to the excellent low temperature flexibility of the rubber and its pronounced tendency to rapidly recover from a shrunken condition to one of positive compression in non-aromatic fuel.

Application: It will not effect metal as to sticking, staining and pitting. It is good for aromatic and non-aromatic fuel use.

Goshen Rubber Company, Inc. Goshen, Indiana

Circle 250 on Reader Service Card

Testing Anker-Holth Hydraulic Cylinder to be used on a metal stretch forming press. Cylinder on test is 16" bore, 69½" stroke, for 3000 psi operating pressure. Tested at 4500 psi.

Thorough testing of Anker-Holth Cylinders assures you dependable power

● Every Anker-Holth Cylinder... large and small... is tested at 150% of working pressure with the latest completely-filtered testing equipment. Anker-Holth testing facilities include portable units such as the one shown... also stationary equipment for pressures up to 10,000 psi.

This is one of many safeguards in manufacturing to assure you top performance and dependability in Anker-Holth Cylinders. There's a type and size of cylinder to match *your* need. Anker-Holth engineering know-how is available to help solve your power motion problems. Call or write ANKER-HOLTH DIVISION of The Wellman Engineering Co., Dept. C-11, 2723 Conner St., Port Huron, Michigan.

FREE: *Bulletin on complete line of ANKER-HOLTH products.*

Anker-Holth
ENGINEERED CYLINDER POWER
WELLMAN

Division of THE WELLMAN ENGINEERING COMPANY

Circle 11 on Reader Service Card

Hydraulics Forum Scheduled for May 11-12

A two day Production Machine Tool Forum will be held in Detroit at the Park Shelton Hotel on May 11 and 12. Sponsored by Vickers, Inc., the meeting will bring representatives of many major users and manufacturers of production machine tools together with key Vickers engineering and service people to discuss common design, operating and maintenance problems pertinent to hydraulic systems and equipment.

It is expected that a considerable portion of the meeting will be devoted to system considerations; i.e., fittings, tubing, hose, safety fluids, "O" rings, seals, hydraulic power units, manifolding of components, etc. Arrangements have been made with J. H. Mansfield, until retirement chief engineer and now consultant for Greenlee Bros. & Company, Rockford, and Gordon Swardenski, assistant manufacturing manager, Caterpillar Tractor Company, Peoria, to conduct the meetings.

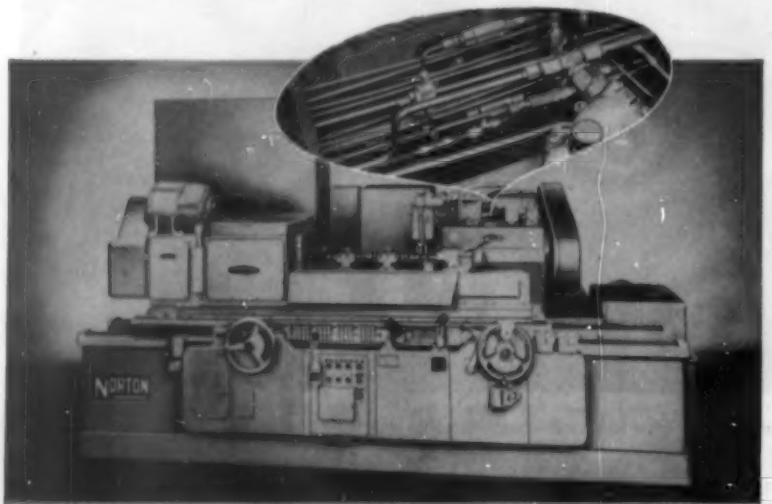
The sessions will be planned primarily for audience participation, using an agenda of recommendations and questions concerning hydraulic component and system troubles prepared in advance. These agenda items are solicited from the participants. The answers will be given from the floor during the meeting by industry people qualified by experience to handle each subject. General discussion will follow every item.

Because of limited space, attendance is by invitation only.

British Industries Fair

Britain's largest industrial trade show, British Industries Fair, will be held this year at London and Birmingham from May 3 to May 14 inclusive. A total of 2500 leading manufacturers will exhibit at one or more of the three sections. As in the past two sections will be held in London and occupy half a million square feet of Exhibition space. The third section, which is devoted to engineering products, is staged at Castle Bromwich, Birmingham, the center of the engineering industry, where no less than 500,000 square feet of indoor space and a park of four acres in which the heavy equipment such as cranes and earthmoving equipment, will be displayed.

The Engineering Section at Castle Bromwich will contain much to interest the user or manufacturer of hydraulic and pneumatic equipment. For example, the Shelvoke & Drewry Freightlifter is a fork truck capable of raising 18,000 pounds to a height of 20 feet and employs hydraulic power to give smooth operation of both lifting and tilting actions.



CAMSHAFT GRINDING—HIGH PRESSURE JOB TAILOR MADE FOR SUPERIOR HYDRAULIC TUBING

One reason why Detroit can turn out cars in such huge numbers is their use of new machine tools which, until a few years ago, were just a gleam in a designer's eye. Good example is the Cam-O-Matic* . . . a high speed, fully automatic camshaft grinder developed by the Norton Company of Worcester, Mass.

The Cam-O-Matic has a highly complex hydraulic system for holding and positioning work, controlled by an electronic brain which times the sequences of operation. To make this tubing network as failure-free as possible, Norton engineers selected Superior carbon steel hydraulic tubing as a standard component. They knew from experience that Superior *higher-than-industry-quality* tubing can take (1) the punishment of vibration; (2) the high pressures put out by modern hydraulic circulating systems; (3) the severe flaring and bending necessary in assembly. As a result, machine down-time due to tubing failure has been eliminated.

If you use hydraulic tubing and your specifications demand exact analysis, unusual fabricating ease and dimensions that are precise—specify Superior. Mail this coupon today for Bulletin 38, Catalog Section 30 and the name of your nearest distributor.

*Trade Mark Reg. U.S. Pat. Off.

Superior

THE BIG NAME IN SMALL TUBING

All analyses .010" to ¼" O.D.
Certain analyses (.035" max. wall) up to 1¼" O.D.

Superior Tube Company
2030 Germantown Ave., Norristown, Pa.

Please send Bulletin 38, Catalog Section 30 on Superior hydraulic tubing, and the name of my nearest Superior distributor.

Name_____
Company_____
Address_____
City_____ Zone____ State____

Another interesting display of hydraulic equipment will be that of Finney Presses, Ltd., who manufacture the Greer-Mercier hydro-pneumatic accumulator under license. The Finney Hydraulic Power Pack to be shown has been designed to take advantage of the power storage capabilities of this accumulator. For example, only 2 hp are required to drive a 5000 psi pump of half-gallon capacity per minute to operate a Finney 120 ton press suitable for plastic or rubber molding. Without the accumulator at least 12 hp would be required to drive a pump of 3 gpm output for the same speed of ram travel.

Many developments in hydraulic seals and packings will be shown. New components produced from fluorocarbon plastics to give exceptional resistance to extremes of temperatures and fluids will be exhibited, by the George Angus Company, who are also showing the recently introduced "Gaco" face-seals for rotating shafts.

Although not exactly a hydraulic component, one of the most interesting new units will be the Mono pump the first pump capable of pumping dry powder.

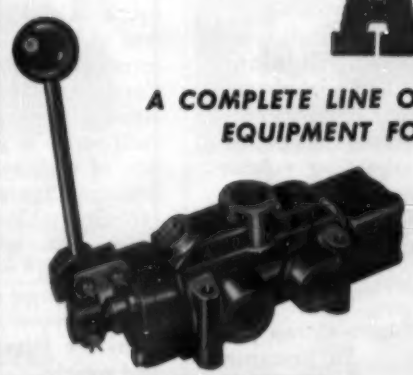
A number of leading manufacturers of compressors, pneumatic components and accessories will be shown. An outstanding exhibit is expected to be the combined display of the three British licensees of The Hydrovane Compressor Co.'s equipment. The Hymatic Engineering Co., Ltd., will display portable compressors of less than 60 cfm and for special purposes such as aircraft and agricultural applications; Buttonwood Engineering Co., Ltd., will show portable compressors over 60 cfm; and Alfred Bullows & Sons, Ltd., will show industrial compressors of all sizes and special purpose applications.

A preliminary survey of exhibitors indicates that the use of hydraulic and pneumatic devices is becoming increasingly popular, particularly in the fields of materials handling and automatic machinery.

J.A.L.

ADEL

A COMPLETE LINE OF INDUSTRIAL HYDRAULIC EQUIPMENT FOR EVERY APPLICATION



For fourteen years ADEL has continuously directed its energies to the advanced development and production of high-quality hydraulic equipment. With the most modern facilities in our 150,000 square foot plant, we build ruggedness, efficiency and compactness into each ADEL unit. The variety of equipment being manufactured has been steadily expanded until today it encompasses a complete line of hydraulic control valves, power pumps, solenoid operated remote controls and related equipment. ADEL can supply you with all the elements necessary to build complete hydraulic systems meeting the most exacting requirements. Make comparisons and see why more and more users, year after year, specify ADEL industrial hydraulic equipment.

A FEW SELECT TERRITORIES ARE STILL AVAILABLE TO PROGRESSIVE DISTRIBUTORS OF HYDRAULIC EQUIPMENT. INQUIRIES INVITED.

Write for Bulletins
ADEL DIVISION OF GENERAL METALS CORPORATION,
10771 Van Owen St.,
Burbank, California

ADEL LEADER IN HYDRAULICS

DIVISION OF GENERAL METALS CORPORATION · Burbank, Calif.

Manufacturers of Industrial Hydraulic Valves and Pumps

DISTRIBUTORS: AIR & HYDRAUUC CO., NEW HAVEN, CONN. • RUSS CHAMBERLIN COMPANY, PORTLAND, OREGON • J. BOYD COATES, PHILADELPHIA, PA. • FRANK T. DONNELLY COMPANY, PITTSBURGH, PA. HASKEL ENGINEERING & SUPPLY CO., SAN FRANCISCO, CALIF. • HASKEL ENGINEERING & SUPPLY CO., GLENDALE, CALIF. • HYDRAUUC BRAKE SUPPLY CO., PHOENIX, ARIZ. • LINCOLN SUPPLY CO., PROVIDENCE, R. I. • SCOTT EQUIPMENT AND ENGINEERING COMPANY, DAYTON, OHIO • H. F. SODERLING CO., SEATTLE, WASH. • ROBERT TAYLOR & SONS, SALT LAKE CITY, UTAH • WYATT SALES COMPANY, CLEVELAND, OHIO • CORBY SUPPLY COMPANY, ST. LOUIS, MO. • INDUSTRIAL AIR & HYDRAUUC EQUIPMENT CO., DETROIT, MICH.

USEFUL LITERATURE

You'll find many valuable production and design ideas in publications described here . . . copies will be sent you free without obligation

HYDRAULIC CYLINDERS . . . for 2000 psi are presented in catalog 721, offered by Hydraulic Power Division, The Hydraulic Press Mfg. Co. Here is a 32 page booklet in color which covers the Model 2000 series cylinders for oil hydraulic service. Some of the things contained in this catalog include the complete line of 2000 psi cylinders, an illustrated index, features and cut-a-way illustrations, a number of mountings, for all types of applications. Single acting, collapsible and large bore cylinders together with special air and hydraulic cylinders for individual requirements. Capacity of these cylinders in pounds at various operating pressures and data regarding volume of oil required per inch of stroke is presented in chart form.

Circle 183 on Reader Service Card

LIMIT SWITCH . . . You can have eleven contact arrangements in one switch. In literature released by Square D Company all the details of this switch are explained, including much technical information. The location of the return spring positioning plate determines the position of the movable contact in the "free" position. Location of the latches determines whether the switch is single acting or double acting with a neutral position. Omission of certain parts converts the switch from quick make and break to slow action, or from spring return to maintained contact. These contact arrangements and adjustments are made with just a screw driver.

Circle 184 on Reader Service Card

DUAL PISTON SEAL . . . and spiral back-up rings are described in engineering bulletins 1014 and 1015 respectively, available from W. S. Shamban & Co. The new series piston ring seal combines two identical piston rings with stepped, sliding joints, staggered to form a continuous seal and a metallic expander ring. The expander ring provides a radial force on the rings for effective low pressure sealing. Seals are available in sizes from ⅛ to 7 in od. "O" ring performance is improved by preventing "O" ring extrusion and reducing packing friction. In some applications the back-up rings can seal without "O" rings, if the packing completely fills the groove in one continuous spiral of several layers. Spirals are available in a range of sizes from .125 to 15.50 in id.

Circle 185 on Reader Service Card

SOLENOID VALVES . . . which are direct operated and for automatic or remote flow control of high viscosity liquids, is the subject material of Bulletin V-2, offered by The Johnson Corp. In this 12 page, two color booklet, complete sizes, dimensions and a cross-sectional view of each series is given. Also presented is a description of each series with construction and design features. Space is given to typical installation, capacity tables and a few accessories such as valve stem lubricator and overload protectors. Bulletin "S" covers separators and aftercoolers. The design of these units is given together with various types and sizes. Other data and dimensions are tabulated such as height, air capacity and weight.

Circle 186 on Reader Service Card

FLOW ALARM . . . Bulletin No. 165, released by Brooks Rotometer Company, explains and describes the range of sensitivity for both high and low flow signalling, and how it can operate in conjunction with spherical floats as small as 3/32 in. Features insure that in the event of power failure, or failure of any electronic component, the load relay will drop out, and operate the alarm contacts. Complete specifications, operating details and application data are given. Two sensing coils may be installed on a single rotometer providing a high-low alarm.

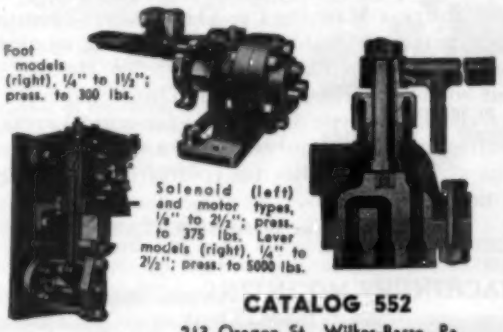
Circle 187 on Reader Service Card

SWITCHES AND ACTUATORS . . . A new 4 page catalog (catalog no. 74) gives complete information on ultra-small precision snap-action switches and auxiliary actuators made by Micro Switch, a division of Minneapolis-Honeywell Regulator Co. The switch has very high electrical rating, for the overall size of any snap-action switch. Three of the fifteen switches cataloged conform to military specifications MIL-S-6743. The catalog contains illustrations of the switches

LARGE PROCESSOR CHOOSES

Nicholson Valves for LONG WEAR

Nicholson cylinder control valves recently completed 10 years of constant use, without servicing, on an operation which had "proved too much for other tested units." This report, from a large rubber firm, again confirms the fact that Nicholson valves, with their specially treated hard seats and non-corrosive lapping flat discs, become tighter with use. Nicholson furnishes valves for cylinder control, distributing and metering service, and for many special operating cycles. For air, gas, oil, steam, water.



Foot models (right), ¼" to 1½"; press. to 300 lbs.

Solenoid (left) and motor types, ⅛" to 2½"; press. to 375 lbs. Lever models (right), ¼" to 2½"; press. to 5000 lbs.

CATALOG 552

213 Oregon St., Wilkes-Barre, Pa.

W. H. NICHOLSON & CO.

TRAPS · VALVES · FLOATS

Cover Band

Holds Spring automatically in place preventing ring from opening up Here

Stops Build Up of Ice, Mud or other Foreign Bodies between Rod and Ring . . .

The wiper edge of the FALL Wiper Ring is TIGHT against the piston rod at all times REGARDLESS OF WEAR. Spring-Loaded. It gives wiper edge a squeeze grip action . . . the squeeze grip is always the same because of the uniform tension of the spring under the endless cover band.

Squeeze Grip Action Does It—*patented*

Ice, grit and other foreign bodies do NOT Build Up under ring. Rod does not stick or become immobile in ANY temperature . . . the FALL ring has complete contact on rod ALL WAYS, always. Insist on FALL Wiper rings. Available from ½" to 13" dia. Military part numbers from AN8231A1 to AN8231A71. Write, wire or phone us your wiper needs.

Used During World War 2 and ever since by the Military.

Fall Wiper Rings Spec MIL-R-5849 are AN approved.

Covered by patents issued and patents pending

Ace Products Co., Toledo 1, Ohio. Phone ADams 6513

Ask About FALL Wiper Rings with Closed Joint
Especially designed for those applications where absolute freedom from dirt passing through joint of ring is required.

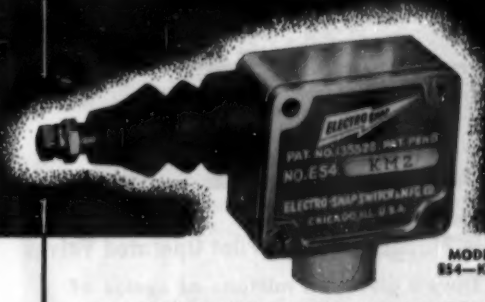
You can depend on ACE PRODUCTS—Established 1935!

Fall Wiper Ring SPRING LOADED

ELECTRO SNAP

NEW ONE WAY IMPULSE SWITCH

For Simplified Control



MODEL 854—KM2

ELIMINATES INTERLOCKING SWITCHES AND COMPLICATED ACTUATING DOGS

This exclusive switch is ideal for pulsing solenoid valves on air-hydraulic controls, sequencing circuits, etc., because it allows other controls to reverse or operate the same circuit. It sends a short electrical impulse and then switches itself out of the circuit.

GIVES MORE DEPENDABLE CONTROL

Switch replaces timers, relays, and troublesome one-way dogs to simplify circuits—cuts chances for failure. No delicate adjustments.

LOWERS COST OF CONTROL CIRCUITS

Impulse switch costs less than complicated control devices it replaces. Fewer switches are required for sequencing. Because of simplicity, maintenance is easy.

SPEEDS UP AUTOMATIC OPERATION

Automatic machines can run faster because cycles can be more closely sequenced. There's no delay due to timer tolerances or extra machine motions to actuate interlock switches.

TRY IT NOW—WRITE FOR BULLETIN ESF-5

SPECIFICATIONS

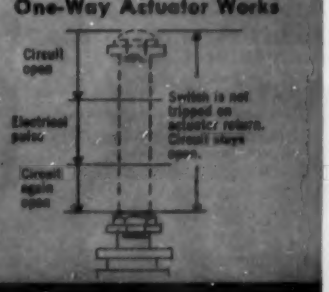
rated at 10 amps., 125/250 v. AC.

Movement differential 0.022".

Operating Force 3½ lbs.

Four models available with overtravel and pulsing strokes from 1/16" to 3/16".

How Exclusive One-Way Actuator Works



ELECTRO-SNAP SWITCH & MFG. COMPANY

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Quick-As-Wink
AIR AND HYDRAULIC
Control Valves

FEATURE THIS MONTH

Single Plunger Solenoid Pilot Operated Valves

They'll give you millions of cycles of efficient trouble-free operation

● Quick-As-Wink Solenoid Valves are unsurpassed for positive, trouble-free dependable service . . . they give users millions of cycles of fast, high speed — and safe — operation. All parts are rugged. Low amperage requirement of the solenoid eliminates intermediate relays and simplifies electrical circuits. ⅜" to 2" sizes. 2-way, 3-way or 4-way actions. Bucking cylinder or double solenoid return. Send for the data sheets. Get full details about Quick-As-Wink, America's outstanding valve line, today.

also the following

PUSH BUTTON OPERATED AIR VALVES

Push-pull or push and spring return operation — ⅛" and ¼" tapped connections. Widely used for controlling cylinders and many other applications. Air to 125 psi — vacuum—can also be used in low pressure hydraulic service.

LEVER OPERATED HYDRAULIC VALVES

Two position or three position valves ½" to 1½" sizes for line pressures 1000 to 5000 psi. Can be furnished in neutral, compound-exhaust or compound-on actions. Pilot cylinder operated types available up to 4".

For Fully Descriptive Data Sheets Write

C. B. HUNT & SON, Inc.

Hand, Foot, Lever, Cam, Pilot, Diaphragm and Solenoid Control Valves

1992 EAST PERSHING STREET • SALEM, OHIO

Circle 71 on Reader Service Card

USEFUL LITERATURE

Continued

and actuators, complete dimensions, available contact arrangements, available terminals and arrangements, operating characteristics and electrical ratings.

Circle 188 on Reader Service Card

EXHAUST SILENCERS . . . that are designed to eliminate high and low frequency noises, caused by high velocity discharge from air devices, is explained in Bulletin No. 265, available from Burgess-Manning Co. The silencers operate on a patented snubbing principle and employ specially designed acoustic reactance chambers plus sound absorbing material. Three models are described. One type of silencing for critical areas, another type for semi-residential and light industrial areas and another for commercial silencing in non-critical areas.

Circle 189 on Reader Service Card

MACHINERY MOUNTING . . . that levels and keeps machines in place. These mountings eliminate drilling floors, installing lag bolts, setting machines and shimming. Each mount has its own built-in leveling adjustment. Machines can be

Prominent User Acclaims

"M-B" Automatic Air Line FILTER, REGULATOR and LUBRICATOR Assembly

The value of "M-B" Automatic Air Line Filters, Regulators and Lubricators is widely known for their effectiveness as a protection to Air Valves, Cylinders, Pneumatic Tools, etc.

"Your 'Sentinel of the Air Line' has been giving us very good service. We have had no complaints at all and I trust that we will be ordering more of them in the near future."

signed: **A. E. Cranston, Sr.**
PRESIDENT

Cranston Steel Strapping Co.
Oak Grove, Oregon

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M·B PRODUCTS
46 Victor Ave.
DETROIT 3, MICHIGAN

Circle 91 on Reader Service Card

Circle 58 on Reader Service Card

Exclusive with

GERBING FLEXIBLE COUPLING!

CONCAVE JAW SURFACES

The concave jaw surface of the new Gerbing Flexible Coupling actually holds the resilient synthetic rubber insert or spider in position, thus eliminating any tendency of the rubber to break or extrude. Capable of handling peak loads, shocks and overloads. Instantly compensates for angular and parallel misalignment.

Available for shafts ½" to 1⅞" and H.P. ranges from fractional to 25. Standard keyways are provided. Deliveries from stock.

Write for details

. . . hold spider in position at all times —No extruding!

NO BREAKING OF SPIDER

CLOSE CONCENTRICITIES ASSURE VIBRATION-FREE OPERATION

GERBING MANUFACTURING CORP.

NORTHBROOK, ILL. (Suburb of Chicago) Dept. AH-5

Portable HydrOILic Test Stands

ELECTRIC DRIVEN DENISON

HTS 3 EM

$1150.00

Delivers 3000 psi at flow of 3.26 GPM for testing aircraft hydraulic system, units, etc., as well as for general experimental work, etc. 7½ HP. 3/60/220 V. 1200 RPM motor drives Denison Axial Piston type pump. Complete with Denison Cylindrical Piston Type Accumulator, FILTERS, Circuit. Controls, hoses and instrument panel assembly. All housed in black crackle enamel unit and mounted on heavy steel frame. Provided with pulling tongue and stationary casters in rear, swivel casters in front. BRAND NEW. Estimated new price $4,000.00

OUR PRICE, ea. **$1,150.00** F.O.B. Marion, Ill.

ACME EQUIPMENT CO., INC.

126 S. Clinton St. Chicago 6, Ill.

ANdover 3-3430

The SIMPLER THE FILTER THE LOWER THE COST

Specify **Bendix-Skinner RIBBON FILTER ELEMENTS . . .**

- LOWER ORIGINAL COST
- SIMPLE, INEXPENSIVE TO INSTALL
- NO EXPENSIVE BACK UP SUPPORT REQUIRED
- PERMANENT TYPE
- HIGH FLOW RATE (EITHER DIRECTION)
- EASILY CLEANED

It seems hard to believe, but you can actually have more efficient filtration at considerably lower cost if you simply use Bendix-Skinner ribbon elements instead of expensive and less adaptable metal edge or metal screen types.

Here's how it works— Bendix-Skinner ribbon elements are inexpensive to begin with and can be installed at far less cost than metallic elements that require special back-up supports. In fact, in practically every instance present metallic-type elements can be changed over to ribbon-type with substantial savings.

Ribbon units are available in diameters from ½" to 6" in any required length with filtration rated at 40 microns (.0016").

Our engineering department will be glad to advise on new installations or to furnish replacement units in a variety of sizes. Write us for details.

PHENOLIC-RESIN IMPREGNATED CELLULOSE

Bendix-Skinner

ORIGINATOR OF **MICRONIC** FILTRATION

BENDIX-SKINNER DIVISION OF *Bendix*

P.O. BOX 135, ROYAL OAK, MICHIGAN

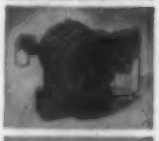
Export Sales: Bendix International Division, 205 East 42nd Street, New York 17, N. Y.

Circle 56 on Reader Service Card

for original equipment vacuum pumps

call on GAST

Motor-Pump Model 0406—To .6 CFM, 25" vac. Wt. 16 lbs., 10½" long.



V-belt Model 1550-V2—To 10 CFM, 15" vac. For paper feeding, etc.

Heavy-duty, fan-cooled Model 1065-V4-34. To 28" vac. with ½ HP.

Heavy-duty, fan-cooled V-belt Model 2565-V12A. To 21 CFM, 28" vac.

Some accessories standard.

YOU GET HIGH QUALITY that solves product problems with long-lived high performance . . . a result of dependable rotary-vane design plus rigid quality control.

A WIDE CHOICE OF SIZES from five basic types to 24 CFM or 28" vacuum. Some models oil-less construction. Our volume sales cut your costs!

YOU GET FULL COOPERATION from Gast engineers backed by over 25 years' experience building vacuum pumps for original equipment. For willing cooperation, call on Gast!

Write GAST—describing your specific application. Request Catalog and "Ideas" Booklet.

Original Equipment Manufacturers for Over 25 Years

GAST ROTARY AIR MOTORS • COMPRESSORS • VACUUM PUMPS
(TO THREE H.P.) (TO 30 LBS.) (TO 28 INCHES)
GAST MANUFACTURING CORP., 181 Hinkley St., Benton Harbor, Mich.

The Biggest PLUS VALUE in Cylinders

For hydraulic pressures up to 1500 or 3000 p.s.i.

They're sturdy—dependable—economical

Use the hydraulic cylinder that will always give you plus performance in your equipment. Designed and constructed to J.I.C. standards, NEPTUNE-POWER PLUS cylinders are available in seven standard mountings—series 1500 for oil and water pressures to 1500 p.s.i.—series 3-1500 for pressures to 3000 p.s.i.

- Bores from 1 to 24 inches —Strokes to 18 feet.
- Pressure ring design permits head rotation to any pipe location.
- Precision fitted piston rings prevent by-pass while offering minimum friction.
- One piece high pressure, self-adjusting, rod packing provides precision bearing and guide for piston rod.
- Single or double end rods, with cushion.
- Other series available for air pressure.

Write for Catalog All

NEPTUNE-POWER PLUS PRODUCTS CO.
2228 Bellevue Ave. Detroit 7, Michigan

USEFUL LITERATURE

Continued

placed where they are desired. The mounts absorb vibrations and shocks that cause unlagged machines "to walk". Bulletin DR-154-10 released by The Barry Corp. describes the mountings and how they operate very completely. A cross-section view shows the mounts before leveling and after leveling. The machine foot is lifted. The mount is placed under it and an attaching bolt with lock-nut already threaded on, is slipped through the mounting hole into the mount. The bolt is turned down until it has bottomed.

Circle 190 on Reader Service Card

OIL-FREE AIR COMPRESSOR . . . for instrument control, food processing, chemical processing, pressure testing food containers and electronic equipment, is described in an 8 page Bulletin No. A-44, released by Joy Manufacturing Company. This compressor is able to supply air which is free of oil contamination because it uses no lubricants in the cylinder. Lubrication is made unnecessary by the use of carbon-graphite piston rings. It is a single cylinder, single stage, double acting water cooled compressor, designed for heavy duty and continuous 24 hour service. Features of the compressor are illustrated and a description is given of each feature.

Circle 191 on Reader Service Card

DESIGNED FOR THE JOB

FLOOR SPACE 48"x54"

50 TON DUAL RAM SPECIAL ASSEMBLY PRESS FOR JET PRODUCTION PARTS

Featuring . . . Manual control of tonnage and rapid ram travel

BUILT FOR THE JOB BY

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8866 GREENFIELD — DETROIT 28, MICHIGAN

Circle 99 on Reader Service Card

Circle 24 on Reader Service Card

POWER PUMPS . . . for capacities to 214 gpm and pressures to 10,000 psi are illustrated and described in Bulletin WP-1099-361, offered by Worthington Corp. For use with hydraulic press or descaling systems, high pressure process pumping, foundry cleaning systems, hydrostatic testing and other high pressure industrial applications. The pumps can be driven by gear motor direct coupled to crankshaft through flexible coupling. Vertical pumps are also available with various plungers in sizes up to 700 hp.

Circle 192 on Reader Service Card

AIR CHUCKS . . . Two types of air chucks, and an improved air cylinder are featured in a new, 8 page, two color brochure available from The Whiton Machine Co. Also described is the micro jaw-set, an accessory which provides precision adjustment of chucks having American standard serrated type jaws. Wedge-actuated and lever actuated chucks are described in considerable detail. Illustrated with photographs and detailed drawings, the brochure gives complete information on standard chucks. Features of air cylinders and other accessories are also explained. Ask for form AC 254.

Circle 193 on Reader Service Card

LOW AND HIGH PRESSURE ROTARY JOINTS . . . with pressures up to 3500 psi, speeds to 10,000 rpm and temperatures to 450 F are

UNBRAKO

dryseal-thread

PRESSURE PLUGS

seal tight

without compound

When UNBRAKO Pressure Plugs are tightened, major and minor diameters are positively sealed, pressure tight without sealing compound. UNBRAKO Dryseal-Thread Pressure Plugs, in a full range of sizes from ⅛" to 1¼" NPTF, are available from your local UNBRAKO distributor's stocks. Write for literature. STANDARD PRESSED STEEL CO., Jenkintown 2, Pa.

UNBRAKO SOCKET SCREW DIVISION

SPS JENKINTOWN PENNSYLVANIA

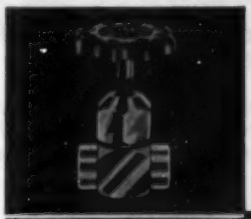
L and L

STEEL HYDRAULIC COUPLINGS

"THE MOST COMPLETE FITTING LINE"

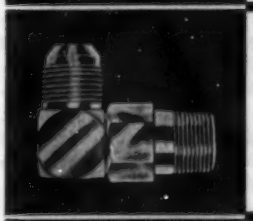
JIC FLARED TUBE
DRYSEAL PIPE FITTINGS
RESTRICTORS
LATERALS
BARBED HOSE STEMS
HYDRAULIC ACCESSORIES

new products :

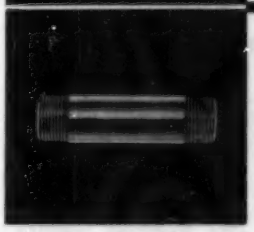


NEEDLE VALVES
- 5000 PSI
- Compact, bar stock body
- Use for shut-off or metering
- Tube or pipe outlets
- Line or angle

BALL CHECK VALVES
- Compact, bar stock body
- Tube or pipe outlets
- Fixed or adjustable spring loading



SWIVEL ELBOWS
- 1200 PSI
- Tube or pipe outlets
- Rotates 360°



PIPE NIPPLES
- Clean bore, seamless steel tubing
- Dryseal NPTF threads
- Cadmium plated

Representatives in principal cities

WRITE FOR CATALOG #53

L and L MANUFACTURING CO.

8088 E. NINE MILE RD.

VAN DYKE, MICH.

here's a 4-wheel solution
to your sticky
hydraulic valve problem

Removes all contaminants from hydraulic oils—30 to 60 g.p.h. models

the
HOFFMAN
portable cartridge filter

PROBLEM

How to provide clean, sludge-free oil to avoid sticky valves on hydraulic machines where oil quantity does not warrant individual, continuous filtration?

SOLUTION

The Hoffman Portable Cartridge Filter. Moves quickly and easily—goes anywhere in your plant to protect machines with periodic scheduled filtration. Surprisingly low in initial cost and upkeep, it occupies no fixed floor space, and is easily operated by one man.

FILTERS WHILE MACHINE OPERATES!

Equipped with quick-connecting couplings, the Hoffman Portable Cartridge Filter hooks up to the oil supply of your machine without interrupting operation. In just a short time, the oil is completely recirculated, and made free of damaging abrasives. Hydraulic presses, hydraulic scrap balers, injection moulding machines, and die casting machines are only a few of the applications of the versatile Hoffman Portable Cartridge Filter.

Write today for Bulletin A-916

For complete purification of used oils

HOFFMAN oil conditioner

25 to 600 g.p.h. capacity. Portable or stationary. Removes solubles and insolubles.

Write today for Bulletin A-974

Hoffman
INDUSTRIAL FILTRATION EQUIPMENT & SERVICE
U. S. HOFFMAN MACHINERY CORP., 239 LAMSON STREET, SYRACUSE 6, N. Y.
In Canada: Canadian Hoffman Machinery Co., Ltd., Newmarket, Ont.

USEFUL LITERATURE

Continued

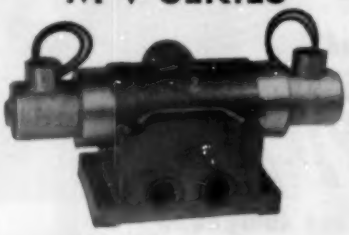
presented in data sheets offered by Anco Division, American Associates, Inc. The sheets are complete with technical information and also include cross-section views of the various types of joints available. An explanation is given for each of these types as to operation and installation. The low pressure joints can be supplied with either ball bearing or carbon bearing and all joints will withstand chemical reactions of materials to be handled. The high pressure type is recommended for installations where pressures are in excess of 350 psi.

Circle 194 on Reader Service Card

DIRECTIONAL AND FUNCTIONAL VALVES . . . for 2000 psi are included in a 52 page catalog (catalog no. 801) released by Hydraulic Power Division, The Hydraulic Press Mfg. Co. The catalog set up in color contains complete information. Some of the subjects included are the following; illustrated index, cut-away illustrations and features, 4-way valves for all design needs, 2-way valves, rotary pilot, relief, sequence, pressure reducing and counter balance valves. Various check valve types and flow con-

MODERN *air fluid* POWER

M V SERIES



SUB PLATE MOUNTED AND THREADED BODY TYPE DIRECTIONAL CONTROL VALVES

WRITE FOR CATALOG
STOCKS IN PRINCIPAL CITIES

CYLINDERS
CONTROL VALVES
PILOT VALVES

All components required for complete automatic and sequence circuits:

Engineering of control circuits

Modernair CORPORATION

Circle 133 on Reader Service Card

Circle 95 on Reader Service Card

trol valves are also included. The catalog is very complete and will answer many questions on the Model 2000 Series.

Circle 195 on Reader Service Card

AUTOMATIC REVERSING PUMPS . . . In catalog No. 105, released by Tuthill Pump Co., the principle of this pump is explained. It is based on the use of a rotor, idler gear and a crescent shaped partition, which is integral with a moving part called the idler carrier. When the shaft rotation changes from counter-clockwise to clockwise, the idler carrier (including the idler gear and crescent) automatically rotates 180 degrees through the suction zone. The idler carrier rotates in a cover casting fitted with stops so that the crescent can rotate only 180 degrees always through the suction zone. The catalog is in color, included are illustrations and cross-section views and tables of dimensions.

Circle 196 on Reader Service Card

SOLENOID VALVES . . . A new 4 page bulletin, 500, on solenoid valves and their applications, is available from J. D. Gould Co. The complete line of valves for automatic, or remote control of liquid flow and air is illustrated and described. There are 25 types of valves included with details

MARSH QUALITY

. . . in a Temperature-actuated

REGULATING VALVE

Smooth, modulating control

— for brine lines in cooling systems

— for condensers where pressure line is not desired

A temperature actuated regulating valve you can depend on—the Marsh-Electrimatic Type WT for pressures up to 150 psi; water, brine or steam. It opens as temperature rises, closes as temperature falls, to give an ideal, smooth, modulated control. Can be mounted in any position; serviced without breaking connections. Seat beads are monel to eliminate wire drawing. Sturdy, two-ply bellows assures extra service life. Temperature ranges of 20°F.-60°F.; 60-100, 100-140, 140-180, 160-220. All standard sizes from ⅜" through 4". All styles of temperature bulbs.

Ask for latest data

MARSH INSTRUMENT CO. *Sales affiliate of Jas. P. Marsh Corporation*
DEPT. 19, SKOKIE, ILL.

EVEN THE BEST CAN BE IMPROVED

Gerotor offers its New QDB series of small capacity pumps as proof!

Gerotor has redesigned its series of small capacity pumps to give even more . . .

- **FLEXIBILITY**—the QDB can be operated in either clockwise or counterclockwise direction by simply changing the position of one internal plug!
- **RANGE OF APPLICATION**—the QDB can be obtained with an extended shaft to operate another pump in tandem, off of one motor!
- **DEPENDABLE SERVICE**—the QDB is built to give more dependable service over a longer service span than any comparable pump. Its longer life reduces your maintenance and replacement costs.

If you have need for pumps in the QDB range, call on Gerotor.

Gerotor makes a complete line of hydraulic pumps in ranges from .4 g.p.m. to 40 g.p.m. The Gerotor engineers can help you solve your hydraulic pump problems. Write for *free literature* and full particulars.

Check this capacity table . . .

Type	Delivery g.p.m.—1800 r.p.m. Discharge Pressure p.s.i.				
	0	250	500	750	1000
QDB .4	.42	.40	.38	.35	.31
QDB .75	.84	.80	.78	.73	.66
QDB 1.5	1.67	1.62	1.57	1.50	1.42

GEROTOR MAY CORP. - Box 86 - Baltimore 3, Md.

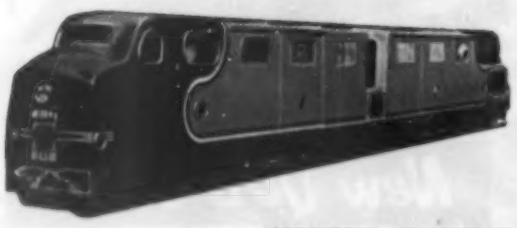
GEROTOR
HYDRAULIC PUMPS & MOTORS

Deri (ENGINEERS) LIMITED

present

DERI SINE PUMPS & MOTORS

The hydraulic pioneers of the new Elizabethan Age.



LOCOMOTIVE INCORPORATING DERI SINE HYDRAULIC POWER TRANSMISSION.

PUMPS

STRAIGHT LINE FLOW NO PULSATION
HYDRAULIC & DYNAMIC BALANCE
WORKING PRESSURES UP TO 2000 P.S.I.
HIGH VOLUMETRIC EFFICIENCY AT ALL PRESSURES
CAPACITIES UP TO 100 G.P.M.

MOTORS

UNIFORM TORQUE AT ALL SPEEDS
STARTING TORQUES UP TO 4000 LBS/INS
OUTPUT POWERS UP TO 100 H.P.
SPEEDS UP TO 1500 R.P.M.
FULLY REVERSIBLE

FULLY PATENTED THROUGHOUT THE WORLD.

Deri

(ENGINEERS) LIMITED

U. S. A. Representatives

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SAN FRANCISCO

HEAD OFFICE:
GODALMING, SURREY, ENGLAND

Circle 36 on Reader Service Card

USEFUL LITERATURE

Continued

on their applications, operation, specifications, design, construction and prices. The models range in size from ¼ to 3 in and handle pressures up to 1200 psi. Valves can be adapted for many uses. Also included are waterproof and oilproof solenoid coils. They can withstand temperatures up to 450 F.

Circle 197 on Reader Service Card

CORROSION TEST DATA . . . showing the comparative resistance of several stainless Croloys to various corrosive media, is presented in technical data card 160 released by Tubular Products Division of The Babcock & Wilcox Company. The folder is designed to be of assistance to engineers involved in the selection of stainless tubing and pipe for corrosion resistance applications. Contained in the 8 pages is also information on the comparative corrosion resistance of stainless steels to corrosive media. It presents data on six widely used stainless tubing steels and several hundred corrosive media at various temperatures and concentrations.

Circle 198 on Reader Service Card

IMPERIAL TUBING TOOLS

. . . for better tubing connection work!

All the tools you need for cutting, flaring and bending J.I.C. steel tubing, stainless steel tubing as well as copper and aluminum tubing.

No. 437-F 37° FLARING TOOL. One compact tool flares 6 sizes of tubing—3/16", 1/4", 5/16", 3/8", 1/2", and 5/8" O.D. tubing. Has easy, single lever clamping. Smooth heat treated sliding dies clamp tubing without scoring it.

No. 537-F 37° FLARING TOOL FOR 4 LARGER SIZES. Has rollers in flaring cone which make flaring of larger sizes easier. Automatically burnishes flares assuring tighter joints. For 3/4", 7/8", 1", 1-1/4", O.D. tubing.

Ask for Bulletin 3011

Also a complete line of tube cutters, 45° flaring tools, tube benders, reamers, etc. **No. 274-F** Tube Cutter and **No. 270-F** Gear Bender are illustrated.

See Your Supply House

THE IMPERIAL BRASS MFG. CO., 1242 W. Harrison St., Chicago 7, Ill.
In Canada: 334 Lauder Ave., Toronto, Ont.

IMPERIAL PIONEERS IN TUBE FITTING AND TUBE WORKING TOOLS

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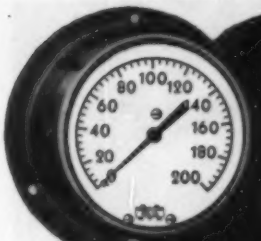
Circle 143 on Reader Service Card



THE *Right* GAUGE FOR YOUR SPECIFIC NEEDS

MARSHALLTOWN

• Available in a wide variety of general purpose and special purpose gauges in pressure ranges to meet your specifications in every particular.

WRITE TODAY FOR COMPLETE INFORMATION

PRESSURE, VACUUM, COMPOUND, ALTITUDE, COMBINATION, DIAPHRAGM, HYDRAULIC, AND SPECIAL PURPOSE GAUGES, DIAL THERMOMETERS, (VAPOR TENSION OR BI-METAL)

MARSHALLTOWN MFG. CO.

800 East Nevada St., Marshalltown 4, Iowa

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hydro-line cylinders series "J"

conform to J. I. C. standards

RUGGED... Where it counts most!

CARTRIDGE . . . metallic rod-wiper, packing, bushing in one unit.

RUGGED BODY . . . all steel end caps and barrel.

PISTON RINGS . . . step-cut joint, long life, minimum leakage.

PRESSURE . . . 2,000 psi heavy-duty . . . 3,000 psi non-shock.

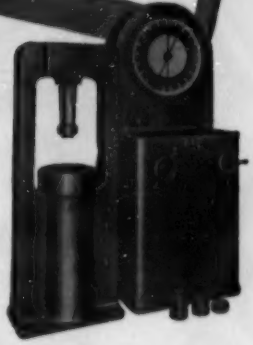
SIMPLICITY . . . no tie-rods . . . no retainer rings.

hydro-line *Manufacturing Co.*

6608 PIKE ROAD • ROCKFORD, ILLINOIS

PALMETTO® G-T® RING

MEANS SIMPLIFIED DESIGN
MEANS LESS MACHINING TIME



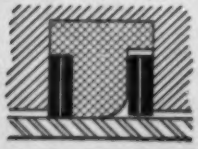
ASK BALDWIN!

The Baldwin-Lima-Hamilton Corporation, Eddystone, Pa. Division, recognized a manufacturing advantage in the PALMETTO G-T Ring. Designing it into their Baldwin Compression Testing Machine (capacity—50,000 lb; pressure—1,000 psi; stroke—3 in.) meant design simplification—a simple groove instead of a complex stuffing box. Here is where engineering foresight paid off . . . Changing to this modern dynamic ram seal not only saved space, but hours of machining as well. Because high sealing efficiency and long service life are maintained along with these manufacturing advantages, the PALMETTO G-T Ring is now standard for Baldwin in this application.

CANNOT SPIRAL . . .

The Palmetto G-T Ring, unlike an O-Ring, will not twist and turn in the groove. T-form prevents spiral failure even in dynamic applications.

CANNOT EXTRUDE . . .



Resilient "T"-section supported by non-extrusion rings on either side makes extrusion impossible. As pressure is applied, non-extrusion rings are urged against cylinder wall, blocking the path of extrusion.

Write for our Manual MP-200, Engineering Standards for Palmetto Molded Packings. For design information on G-T Rings, see our catalog in Sweet's Product Design File.

PALMETTO Packings

packing more performance into every application

GREENE, TWEED & CO. North Wales, Pa.

Post Scripts of Industry

News about people, manufacturers and sales organizations

Elton W. Turner
The Hydraulic Press Mfg. Co.

The Hydraulic Press Mfg. Company of Mount Gilead, Ohio has announced the appointment of **Elton W. Turner** of East Detroit, Mich., as sales engineer. He has been attached to the district sales office at Detroit. All sales engineers receive training in every phase of the company line. Also announced are the sales engineering appointments of **Bruce H. Lowe** of Battle Creek, Mich., **Raymond L. Moreland** of Millcreek, Pa., and **Harry R. Chase** of Oakmont, Pa.

Harry W. Ellis
General Dynamics Corp.

Harry W. Ellis has been named midwestern regional manager for **Electro Dynamic Motor Generator Division** of the **General Dynamics Corp.** Ellis' sales experience covers a period of ten years in the electric motor and the electric control field, including five years in administration sales work.

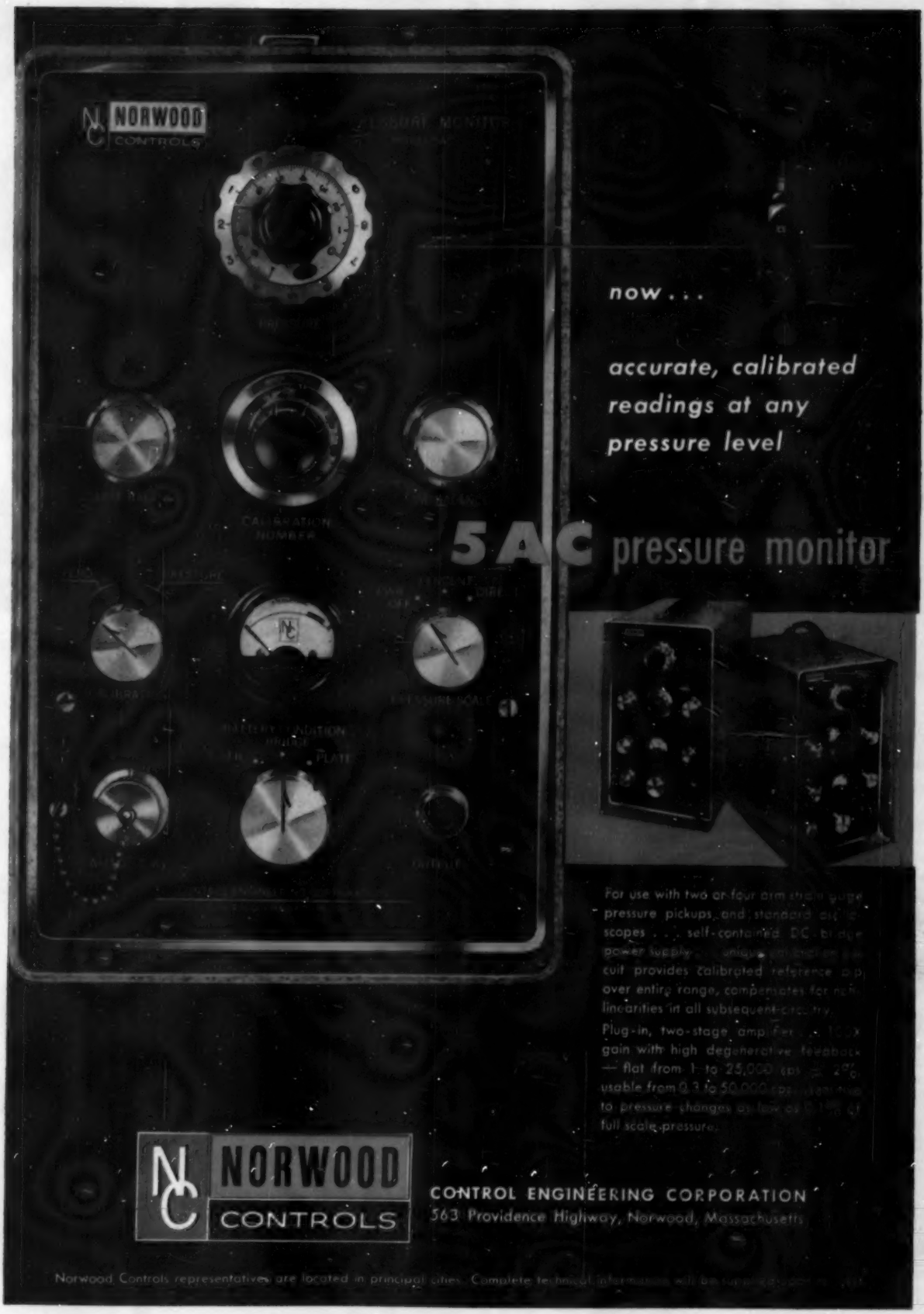
Carl L. Gosewehr
The Oilgear Co.

To better serve the southwest Pacific territory, The Oilgear Company has appointed **C. L. Gosewehr** to assist E. H. Parduhn. For several years he has worked in the pump assembly and test departments, the engineering laboratory and engineering field service. His headquarters will be at the Oilgear Los Angeles office.

Stockholders of **Airway Products, Inc.**, have re-elected **J. L. Stinson** as president, and **H. R. Greenley** vice president. New members of the board of directors include **Eric Bentlage**, general manager of Landis Manufacturing Company and **Andrew Brodie**, secretary of Banion Corp. of Detroit. Stinson announced that plant production facilities would be increased by eight thousand square feet with construction to start immediately. Engineering and research laboratory facilities are also being expanded.

The appointments of **C. L. Peterson** as divisional vice president of the **Brown Instruments Division** of **Minneapolis-Honeywell Regulator Co.** and **O. B. Wilson** as general sales manager were announced recently by H. F. Dever, president of the division. Peterson who has been general sales manager of the division since July 1952, will devote the major part of his time to sales policy matters and long range planning. In addition, he will assist Mr. Dever in carrying out managerial duties at the policy making level. Mr. Wilson, industrial instruments sales manager since January 1953, will assume active administration of the entire divisional sales department.

Garvin A. Drew has recently been promoted vice president of **Scovill Manufacturing Company, Inc.**, in charge of sales, service, advertising and sales promotion for **A. Schrader's Son Division.** Following his initial training in manufacturing methods at the Brooklyn plant, he became a salesman in the Detroit area and after several other asignments was appointed Pacific coast man-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CONTROLS
now . . .
accurate, calibrated
readings at any
pressure level
5 AC pressure monitor
For use with two or four arm strain gage pressure pickups and standard oscilloscopes . . . self-contained DC bridge power supply . . . unique compensation circuit provides calibrated reference dot over entire range, compensates for non-linearities in all subsequent circuitry. Plug-in, two-stage amplifier . . . 100 x gain with high degenerative feedback — flat from 1 to 25,000 cps ± 2%, usable from 0.3 to 50,000 cps . . . responds to pressure changes as low as 0.1% of full scale pressure.
NORWOOD
CONTROLS
CONTROL ENGINEERING CORPORATION
563 Providence Highway, Norwood, Massachusetts
Norwood Controls representatives are located in principal cities. Complete technical information will be supplied upon request.

Pantex Manufacturing Corporation

. . . established in 1927 and one of the largest manufacturers of hydraulic valves for aircraft manufacturers, has available an unusually effective and adaptable line of hydraulic controls for industrial applications.

Designed, engineered and manufactured to highest performance standards, each Pantex unit is analyzed, tested, and inspected in one of the most modern hydraulic laboratories.

Literature available.

ager in 1935. He was later recalled to Brooklyn and made general sales manager.

The appointment of **R. F. Allen** as assistant to the executive vice president, **H. K. Porter Company, Inc.,** was announced by T. M. Evans, president. Allen comes to Porter with several years of management background. He will assist the executive vice president in all phases of operation of the company and its various divisions. Allen most recently was president of Stansteel Corp. and has acted in other management capacities.

Lockheed Aircraft Corp. has announced plans to move its Missile Systems Division from Burbank to larger quarters at the company's Van Nuys plant. Elwood R. Quesada, vice president and general manager of the

The Hydraulic Press Mfg. Company of Mount Gilead, Ohio, was host to members of the Hydraulic Press Engineering Standards Committee of the Hydraulic Press Group of National Machine Tool Builders Association for its regular meeting March 12.

Members attending the meeting were, left to right: C. W. Lindahl, chief of general engineering, Denison Engineering Company; S. H. Durbin, associate chief engineer, E. W. Bliss Company; A. J. DeMatteo, chief engineer, Watson-Stillman Company; R. V. D. Strong, chief engineer, F. J. Stokes Machine Company; William Staecker, chief engineer, E. W. Bliss Company; W. H. Bennett, director of engineering, The Hydraulic Press Mfg. Co.; T. W. Bannon, chief engineer, Clearing Machine Corporation; John M. Dolan, vice president and general sales manager, The Hydraulic Press Mfg. Co.; R. A. McGrath, assistant to general manager, National Machine Tool Builders Association; H. L. Reynolds, vice president, Vernon Allsteel Press Company; E. Wiedmann, chief engineer, The Oilgear Company; F. S. Kraujalis, assistant chief engineer, Hannifin Corporation; P. J. Lindner, chief engineer, Press Division, The Hydraulic Press Mfg. Co.; R. J. Lindsey, chief engineer, Elms Engineering Division, American Steel Foundries.

The purpose of this committee is to establish minimum specifications for various types of presses and to establish standards which promote interchangeability of dies and other tools between presses.

Circle 104 on Reader Service Card

Now...

more hydraulic work

than ever before!

Pantex

¾" Pilot Operated 4-Way Valve
Solenoid Controlled
100-5,000 p. s. i.

This wide-range Pantex Valve offers many unusual operating features, for instance:

Hollow Type Spool
gives true open-center valve, provides *through-flow passage* to tank port when spool is centered and both cylinder ports blocked,

Tandem Operation
possible with two or more valves and with only one "out" and "in" tank line used,

Simple, Compact, Economical
installation and operation made possible by single conduit connection; less inrush amperage; and replaceable cartridge-type solenoid coils—

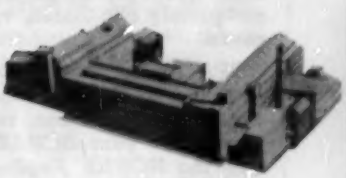
. . . plus other features of fast response, low leakage and choice of six spool types make this valve an unusually effective unit for present or contemplated hydraulic control applications.

Also available—

Relief Valves
350 — 5,000 p.s.i.

¼" Directly Operated 4-Way Valve
Solenoid Controlled
100-5,000 p.s.i.

¾" Pilot Operated 4-Way Valve
Remotely Controlled
100 — 5,000 p.s.i.



. . . hydraulic control specialists . . .

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MANUFACTURING CORPORATION
PAWTUCKET, RHODE ISLAND

since 1927

Circle 108 on Reader Service Card

HAND HYDRAULIC PUMP

Single and Double Designs
to 20,000 PSI
With or Without Reservoir
Standard Reservoirs
70- 160- 910-Cu. In. Capacity
Interchangeable Pistons
⅜ - ½ - ¾ Inch
1-Inch Piston (Special)
Pipe connections ¼" N.P.T.
Handle length is 18 inches.
"We specialize in hand pump units to operate in temperatures from minus 65 F to plus 160 F and with any capacity reservoirs required."
The single pump with ½" or ¾" piston now available in stainless steel.

WILLIAM S. PINE
1635 E. 22nd St., Los Angeles 11, Calif.

Post Scripts of Industry

division, reports that the move will provide excellent research and development facilities. By the end of 1954 the new division will require approximately one-half of the 400,000 sq. ft. of factory space available at the company's Van Nuys installation. A new telemetering laboratory, now under construction will be put into operation in May.

The **Beckett-Harcum Company** of Wilmington, Ohio has announced the opening of a branch office in Birmingham, Alabama. **H. H. Hackett** who has had twelve years experience in air and hydraulic applications is the southern manager.

Appointment of **Herbert Boshea** as purchasing agent for the **Bridgeport Thermostat Division** of **Robertshaw-Fulton Controls Company** has been announced by the A. D. Rapuano, vice president and general manager. Prior to joining the controls company, Boshea was with the General Electric Company.

The corporate name of the American Leather Belting Association has been changed to the **National Industrial Leather Association.** This change is made so as to provide the organization with a name more fitting with the leather products manufactured by its members. The association was organized originally as a trade association of manufacturers of flat leather belting. In recent years, its activities and its membership have been extended so as to include manufacturers of mechanical leather packings, textile and other industrial leathers. Under

Clamping Device on Abrasive Cut-off Saw Operated by NOPAK

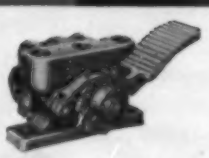
MODEL E CYLINDER

This efficient clamping device was developed by a Canadian distributor of industrial supplies, to speed up and simplify the cross-cutting of pipe, rod stock, angle iron and other shapes. A NOPAK 2" x 6" Model "E" Cylinder, suspended from the top of an "A" frame, supplies the downward pushing power which holds the stock firmly in place while the abrasive saw does the cutting quickly, squarely and accurately.

Cylinder is actuated by a NOPAK Model "F" Foot Operated Valve which leaves operator's hands free . . . and enables him to move about between cuts until he again steps on foot lever to release clamp. Slow, manual manipulation of clamps or vises is completely eliminated, valuable time and effort is saved.

NOPAK Cylinders and Valves are used throughout industry, in thousands of similar applications, to accelerate production, reduce costs, minimize fatigue. Ask your NOPAK representative to show you the NOPAK Application Manual.

GALLAND-HENNING NOPAK DIVISION
2743 S. 31st St. • Milwaukee 46, Wis.
Refer to Sweet's File for Product Designers or write for Bulletin SW-2.
Representatives in Principal Cities



NOPAK Model "F" Foot Valve

NOPAK
VALVES AND CYLINDERS
DESIGNED for AIR and HYDRAULIC SERVICE

A 7878-½H

W. F. Rogge
Aeroquip Corp.

Marvin W. Brandau
Aeroquip Corp.

the reorganization the membership of the association will be classified under three divisions; Leather Belting, Mechanical Leather Packing and Textile Leather. The affairs of the association itself will be governed by a Board of Directors and each division by officers consisting of a chairman and vice chairman.

Aeroquip Corporation, Jackson, Mich., has announced the promotion of **Marvin W. Brandau** from industrial sales manager to director of market development. In his new position, Brandau will concentrate all his efforts to develop new markets and to find new applications for the company's products. **W. F. Rogge** replaces Brandau as industrial sales manager. Rogge was formerly general sales manager of World Bestos Division, Firestone Tire and Rubber Company.

SEND your specifications for hydraulic cylinders to American, specialists in hollow boring and honing. We manufacture from tubing or forgings in carbon or alloy steels up to 15" I.D. Over 40 years experience backed by precision machines and skilled craftsmen will save you time and money. Send your blueprints.

Telephone
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AMERICAN HOLLOW BORING COMPANY
1954 RASPBERRY STREET • ERIE, PA.

SPECIALISTS IN THE MANUFACTURE OF **HYDRAULIC**

CYLINDERS

O-M CYLINDERS
(air • hydraulic)

FIT WHERE OTHERS WON'T!

O-M Cylinders require up to ⅓ LESS INSTALLATION SPACE than conventional cylinders of the same bore, because O-M's *Special Interlocking Mechanism* eliminates projecting tie rods and bulky end caps. In addition, the "O.D." of O-M Cylinders can be easily and accurately machined for cartridge mounting within your equipment.

O-M Special Interlocking Mechanism also assures perfect alignment giving O-M the lowest coefficient of friction of any cylinder. Thus, O-M Cylinders are smoother operating at low or high speeds regardless of length of stroke. Easily removed, inspected, repaired, replaced. Completely interchangeable parts.

Available in a full range of sizes (1½" to 8" bores) with standard, 2 to 1 or oversize rods.

14 day delivery on most sizes

Write today for FREE catalog and complete set of ½- and ¼-scale templates showing all cylinders and mounting brackets.

MAIL COUPON NOW!

ORTMAN MILLER MACHINE CO.
1204 150th Street • Hammond, Indiana
☐ Please send latest O-M catalog.
☐ Please send complete set of templates.
Name.....
Company.....
Address.....
City.....Zone...State...

Post Scripts of Industry

Stratoflex, Inc., has moved into spacious new general offices at 5255 River Oaks Blvd., in Fort Worth, Texas.

William H. Atcheson has been appointed as a salesman for the **Metal Products Division** of the **Darling Valve & Manufacturing Company**, Williamsport, Pa. His territory will include the New York City area. Atcheson comes to the company after five years with the Pennsylvania Pump & Compressor Company. Also announced is the appointment of **Bern. F. Marcin** and **W. L. Geurin** as sales representatives for Darcova Products Division. Marcin has worked in both the engineering and sales field. His territory will include portions of the northeastern United States. Geurin will handle Darcova Products in the state of Illinois.

Francis J. Kinsella
Standard Pressed Steel Co.

Francis J. Kinsella has been named manager of outside sales by the **Standard Pressed Steel Co.**, Jenkintown, Pa. Kinsella, formerly midwest regional sales manager for SPS moves to a post left vacant when **George A. Gade** was elected vice president in charge of sales last year. In 1951 he was made district sales manager and in 1952 midwest regional sales manager.

Proctor H. Avon has been appointed director of engineering for **Monsanto Chemical Company's Organic Chemicals Division.** It was announced by Charles H. Sommer, vice president and general manager. Avon succeeds **Willis M. Cooper**, who was promoted to director of engineering in the company's new research and engineering division. Chief engineer since last September of the titantium research project, Avon had previously been division engineer of the Merrimac Division.

D. A. Nabb, general manager of **Detroit Tube & Steel Division** for the **Sharon Steel Corp.** has announced the promotion of **R. A. Johns** to general sales

When you must have... O-RINGS

FIT FOR THE JOB

FIT FOR THE JOB

FIT FOR THE JOB Specify

FIT FOR THE JOB GOSHEN

FIT FOR THE JOB

FIT FOR THE JOB

Meeting exact specifications for close tolerances and uniform quality, Goshen O-rings from special compounds of natural or synthetic rubber have proven "fit for the job" on hundreds of successful installations. They're precision molded, in a complete range of MS, AN, SAE and JIC standard sizes, as well as many non-standard sizes and special shapes. Make Goshen your one dependable source for all O-ring requirements.

FREE — NEW O-RING BROCHURE
Twelve pages of information on sizes, groove dimensions, application data. Designed to help in obtaining efficient sealing for most every type of application.

See our "facilities" catalog in Sweet's Product Design File.

BETTER FUNCTIONAL RUBBER PARTS through ENGINEERED COMPOUNDS

Goshen Rubber Co. INC.
MOLDED · DIE CUT · LATHE CUT RUBBER. SPECIALTIES SINCE 1916
1554 S. TENTH ST. ● GOSHEN, INDIANA

Circle 60 on Reader Service Card

Announcing

new **ASCO.**
2-Way Solenoid Valve
for controlling the flow
of Air, Gas, Light Oil,
Water, Brine, Freon,
Methyl Chloride, etc.

BULLETIN 8210A
SOLENOID VALVE
shown approximate size

Pipe sizes—
3/8" and 1/2"

Maximum pressure—
Air—200 p. s. i.

Featuring:

- **Compactness** — 2¾" Face to Face.
  3¼" Pipe center line to top of Solenoid.
  3 13/16" Overall Height.
- **Simplicity** — Only two operating parts: flexible diaphragm and stainless steel core.
- **Ruggedness** — Designed for millions of maintenance free operations.
- **Forged Brass Body and Bonnet** insure freedom from porosity.
- **No Corrosion Problems** — All parts in contact with fluids are of brass or stainless steel.
- **Normally Open or Normally Closed** Types Available.
- **Low Power Consumption** — Only 10 Watts!
- **No Jamming or Binding** — No closely fitted parts that can be jammed by solid matter.
- **Nema I Standard or Nema VII** Explosion-Proof Solenoid enclosures.
- **Over Two Years** under Development and Life Test!

THIS NEW BULLETIN 8210A SOLENOID VALVE IS ONE OF THOUSANDS OF TYPES & SIZES IN OUR STANDARD LINE.

WRITE FOR COMPLETE INFORMATION

We design and manufacture a complete line of Solenoid Valves and Electromagnetic Controls including Automatic Transfer Switches, Remote Control Switches, Contactors, Relays, and Complete Control Panels.

ASCO Solenoid VALVES

Automatic Switch Co.

385-H LAKESIDE AVENUE · ORANGE, NEW JERSEY

manager of the company. At the same time **Robert I. Petrie** was named manager of the order department at the Detroit plant. **Ransom A. Johns** joined the company as assistant manager of sales in 1947. Robert Petrie joined the company in 1947 and has had working experience through many of the division's departments.

The R. M. Reichl Company has been established, specializing in development-engineering, process-development and consulting, with offices at 110-11 Seventieth Road, Forest Hills, L. I., New York. The new company has been organized by **R. M. Reichl**, formerly vice president of Hydropress, Inc., New York. He has been active in the field of heavy presses, extrusion, hydraulic machinery, pipe mills and rolling mills for over 20 years.

Airlenco Inc., 198 Wayne St., Mansfield, Ohio, has taken over the proprietary business formerly operated as Air-Line Engineering Company and will produce the same equipment with some additions to the line. Active officers of the new company are T. J. Farquhar, president and sales manager and C. N. Walter, secretary-treasurer and production manager.

Paul W. Norris
Denison Engineering Co.

Robert H. Krepps
Denison Engineering Co.

W. C. Denison, president **Denison Engineering Company**, Columbus, Ohio has announced three executive promotions. **Paul W. Norris** was appointed director of sales. **Robert H. Krepps** was promoted to sales manager and **Robert R. Hyatt** was appointed Director of industrial relations. In his new

Equip your valves for
AUTOMATIC PROCESSING
REMOTE CONTROL
POWER OPERATION

(Above) High Pressure Gate Valve with Ledeen Valve Actuator.
(Left) Ledeen Tandem Type Valve Actuator on Standard Plug Valve.

with
Ledeen VALVE ACTUATORS

★ Simple, Rugged Construction.
★ Few Moving Parts.
★ Easily Installed.
★ Prompt Delivery.

These actuators are for the automatic operation of gate, diaphragm, plug and other line valves, and are pneumatically or hydraulically operated for direct or remote control. Designed as package units, they are mounted directly on the valves without need of special manifolds or outside supports. They are easily, quickly and rigidly installed on new valves or on valves in service.

Ledeen Valve Actuators provide positive operation, permit automatic processing, safety installations, multiple central control ,and require a minimum of maintenance. WRITE FOR BULLETIN 3000.

VALVES • CYLINDERS
VALVE ACTUATORS
AIR HYDRAULIC
PUMPS & BOOSTERS

Ledeen Mfg. Co.
1610 SO. SAN PEDRO STREET
LOS ANGELES 15, CALIFORNIA

capacity, Mr. Norris will have complete supervision of, and responsibility for, all domestic sales, advertising, service and sales promotional activities. He is a veteran of 20 years with the company. Krepps joined the company in 1939. In 1949 he was promoted to manager of Denison's Chicago Branch. He was later made assistant sales manager, then sales manager, multipress division, his most recent position. Mr. Hyatt, joined Denison in 1950 to do administrative work and handle government controls and legal matters. Prior to joining the company he worked with the Curtiss-Wright Corp.

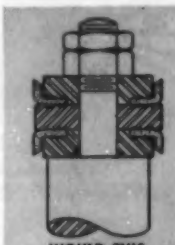
Joy Manufacturing Company, Pittsburgh, Pa. announced on April 1st the opening of a new district office at Cleveland, Ohio for more convenient sales and service to the industrial, construction, quarry and metal and non-metallic operations in the Ohio-Michigan area. **Howard E. Butters,** formerly district manager in St. Louis, Mo., has been appointed district manager at the new Cleveland office with headquarters at 2410 Terminal Tower.

D. W. Holmes, vice president in charge of sales and D. A. Cameron, industrial sales manager at **The Parker Appliance Company** jointly announce the appointment of **Robert D. Beatty, Jr.,** as a sales engineer for the company in the Alabama-Florida territory. Beatty joins Parker with more than 13 years experience in sales and engineering work in the south. Upon completion of an extensive training course at the home plant, Beatty was assigned to serve industry in the southern territory. The appointment is also announced of **Harold E. Kirby** to a newly created position as sales engineer in the Carolinas and eastern Tennessee territory. Also announced are three promotions involving manufacturing assign-

quality control

MARSH IMPREGNATED LEATHER PACKINGS

to your specifications



CUP PACKING

FLANGE PACKING

U PACKING

VEE PACKING

NON-EXTRUSION WASHER

DIAPHRAGM

Your packing problem — where quality control determines the successful application — has a solution! MARSH with more than half a century of experience plus continuous on-the-job and laboratory research, supplies the mechanical leather packing for your job—cut, formed, treated, engineered to meet YOUR SPECIAL REQUIREMENTS.

MARSH Field Engineering and Consulting Service, quickly available, helps you determine the specific leather packing for greatest efficiency, longer wear, lower cost — for your job.

MARSH PACKINGS, selected, tanned, impregnated to the job specifications, provide superior custom leather sealing with —

- Low coefficient of friction both static and running
- Greater wear resistance combining toughness with strength
- Tighter sealing proper impregnation for varied pressures
- Temperature stability through a wide range of temperatures

ENGINEERING and CONSULTING SERVICE

If you seal oil, water, air, vacuum, gas, gasoline, naphtha, alcohol, or other fluids, ask MARSH for field engineering service, immediately available to you for the job you are designing, tooling, manufacturing.

WRITE FOR ENGINEERING HANDBOOK AND TECHNICAL LITERATURE

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SALES OFFICES: 75 E. Wacker Drive Chicago 1, Illinois; 101 Park Avenue New York 17, N. Y.; 548 S. Border Road Winchester, Mass.; 1900 Euclid Avenue Cleveland 15, Ohio

Keep your hydraulic systems free from ferrous particles with

FERROFILTER

Magnetic Separators

Reduce shutdowns of equipment as well as wear on pumps, pistons, cylinders and gears to a minimum by extracting those troublesome abrasive ferrous particles from hydraulic fluids.

Liquid flows through at low velocity through a stack of grids (one shown here) strongly magnetized by Alnico permanent magnets. The "honeycomb" design splits the stream and even the smallest ferrous particles pass close to and are caught on the magnetized grid edges. All parts easily cleaned. Ferrofilters have no moving parts; no replacements to buy; are easily and quickly installed.

Models PO-3 and smaller

Send for BULLETIN PM-65

S. G. FRANTZ CO., Inc.

P. O. Box 1138 Trenton 6, N. J.

Post Scripts of Industry

ments. **Walter C. Loeman** was named manager of the Tube and Hose Fittings Division to succeed L. C. Aldridge who resigned. **James F. Davis, Jr.,** formerly purchasing agent for the Industrial Hydraulics Division, was promoted to fill Loeman's former position as production manager of the Industrial Hydraulics Division. The purchasing agent vacancy left by Davis will be filled by **Wayne D. Harrold** who has been with the firm since 1940.

Separation of **Pacific Airmotive Corporation's** manufacturing operations into two divisions was announced by Neal J. Coleman, PAC vice president. Coleman stated that the newly created test and handling equipment division will be responsible for manufacturing activities at the company's Burbank plant as well as establishing a manufacturing plant at the company's Linden, New Jersey plant. Coleman has named **Carl R. Wettereau** manager of the test and handling equipment division. For the past 10 years Wettereau has been assistant chief engineer of Greer Hydraulics, Inc., in charge of their test machine activities.

Miller Motor Company has changed its name to **Miller Fluid Power Company.** The change in name does not involve any change in company ownership, products, management, personnel or policy. The company's address remains the same.

The appointment of **Stephen F. Keating** to the newly created post of vice president of the **Aeronautical Division** of **Minneapolis-Honeywell Regulator**

At GROBAN'S—Your Hydraulic Market Place

Brand New **HYDRAULIC EQUIPMENT**

FOR IMMEDIATE DELIVERY FROM OUR STOCK

RUGGED! **25 TON** MASSIVE!

HYDRAULIC CYLINDER

ITEM #1815—• ALL STEEL CONSTRUCTION • 8" BORE—15" STROKE • DOUBLE ACTION • 50,000 LBS. PRESSURE WITH 1,000 P.S.I. PUMP OUTPUT • UP TO 70,000 LBS.—CAPACITY ON INTERMITTENT SERVICE. • SOLID STEEL 2½" PISTON ROD • 1" PORTS • OVERALL DIAMETER 10¼" • DISTANCE BETWEEN CENTERS—28⅛" CLOSED—43¾" OPEN.

IDEAL FOR
• HYDRAULIC PRESSES
• DUMP TRUCK HOISTS
• HYDRAULIC TABLES
• LEVELING RAMPS
• INDUSTRIAL MACHINERY
• ROAD MACHINERY
• HYDRAULIC FEEDS
• HYDRAULIC TAIL GATES

ITEM #1815

Replacement cost—$380.00 Shipping Wt.—185 lbs. SPECIAL PRICE **95.00** F.O.B. Chicago

ALSO ITEM #1715—• 7¼" BORE—15¼" STROKE • 41,300 LBS. PRESSURE WITH 1,000 P.S.I. PUMP OUTPUT • OTHER FEATURES SAME AS ABOVE

Replacement cost $260.00 Shipping Wt.—155 lbs.

SPECIAL PRICE..... **80.00** F.O.B. Chicago

FOUR-WAY, OPEN CENTER

CONTROL VALVE

ITEM #126—Four-way open center control valve, with built-in adjustable relief valve factory set at 1000 P.S.I. Spring loaded neutral position. For use with one double acting cylinder. In neutral position cylinder is locked and pump unloaded. Can be used as single unit or mounted in series. Has ⅜" pipe thread inlet and outlet. ½" pipe thread cylinder ports. Newly manufactured to our specification. Ship. Wt. 8¼ lbs.

An Outstanding Buy! **21.50** F.O.B. Chicago

BERRY—HEAVY DUTY

HYDRAULIC PUMP or MOTOR

ITEM #156—use as road machinery, vibrators, paper mills, wire reels, hydraulic presses, speed control units. Ball bearing construction, balanced cam design assures high efficiency performance. When used as a pump: delivers 11 G.P.M., 1000 P.S.I., 5 H.P. At 1800 R.P.M. as a HYDRAULIC MOTOR: Rated up to 12 H.P., up to 2400 R.P.M. Standard ⅜" pipe thread ports. ¾" shaft with keyway. Dimensions: 14½"x 8"x 7". Weight 42 lbs. Regularly $212.00.

OUR SPECIAL PRICE 2 for 110.00 . . . ea. **59.50** F.O.B. Chicago

ORDER DIRECT FROM AD
SATISFACTION UNCONDITIONALLY GUARANTEED
SEND PAYMENT OR PURCHASE ORDER TODAY

FREE SUMMER EDITION 1954 CATALOG

52 PAGES, chuck-full of unsurpassed War Surplus Equipment Bargains for farm, home, factory and workshop. Write letter today.

To Place Phone Orders CALL WEbster 9-3793

GROBAN SUPPLY CO. DEPT. AH-5
1139 SO. WABASH AVE., CHICAGO 5, ILL.

Company, has been announced by A. M. Wilson, executive vice president. Keating formerly was assistant general manager of the division. He has served in various administrative capacities since joining the company six years ago.

Joseph R. Roberts
Aeroquip Corp.

Dogan H. Arthur
Aeroquip Corp.

The appointment of **Joseph R. Roberts** as advertising manager was announced by **Aeroquip Corp.**, Jackson, Mich. Roberts joined the company after serving with the International Harvester Company in Chicago where he was supervisor of industrial power advertising and sales promotion. In his new position he will be responsible for all advertising and sales promotion activities of the parent company and its subsidiaries. Also announced was the appointment of **Dogan H. Arthur** as assistant aircraft sales manager. Arthur has been with the company since 1951 serving first in the customer service department, later as aircraft staff engineer in the northeast.

Chem-o-green Back-up Rings—made of duPont chemically impervious TEFLON—answer the "O" Ring extrusion problem. Three types—solid rings, split rings and the popular spiral rings for quick, easy installation.

- Eliminate chemical inspection.
- Zero swelling in hydrocarbons and newer synthetic fluids.
- Service temperature range from minus 110°F to 500°F.
- Waterproof, non-flammable.
- Requires no water-soak for installation.
- Unsurpassed anti-friction properties.

Chemiseal "O" Rings—a complete line of homogeneous synthetic rubber packings made in both AN and commercial compounds.

Both a "packing package", made in all standard sizes for "O" Ring gasket, packing and universal tube fitting services.

Take advantage of one source and one responsibility for this important "packing package". Write for Bulletin OB-1152.

UNITED STATES GASKET COMPANY
CAMDEN 1 · NEW JERSEY
FABRICATORS OF duPont TEFLON
Kel-F AND OTHER PLASTICS

Circle 132 on Reader Service Card

Post Scripts of Industry

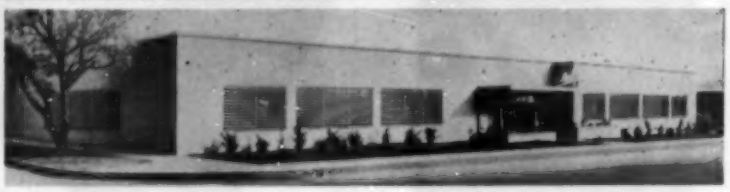
Hunley A. Slaughter of Craig Sales & Engineering Co., in Memphis, Tenn., has been appointed district manager in Tennessee and Arkansas by the **American Flexible Coupling Co.**, Erie, Pa.

SPS Completes Phase of Plant Expansion Program

Standard Pressed Steel Co. has just completed a $10,000,000 phase of a continuing program of expansion and modernization under which the Jenkintown, Pa. firm has doubled its floor space to 650,000 sq ft in the last four years.

Under the expansion half of which was in construction and half in new and modern machinery and equipment, SPS built a modern, integrated, one roof plant on the site where there had been many separate buildings housing various production processes. Construction is heavy steel frame with brick facing.

As new buildings replace old ones, the company installed a plant wide high voltage electrical distribution system, more than half a mile of mechanical conveyors, a central scrap handling giant that pulverizes metal turnings, a plating operation including a waste treatment plant purifies plant liquids before discharging them into a neighboring stream. Nine acres of land were developed for employee and community recreation and parking.



The Haskel Engineering & Supply Co. new plant in Glendale, Cal., has 15,000 sq ft of space and is the home of both Haskel Engineering & Supply Co. and Haskel Seals, Inc. The Enginering Department, including test laboratory, accounts for about 3500 sq ft of the area and the rest is divided between offices, warehouse space and manufacturing space. Approximately seventy people are employed at the Glendale plant. With the opening of a new office in Seattle, Haskel now offers complete West coast coverage for eastern suppliers, having offices in Seattle, San Francisco, Glendale and San Diego.

And Now-A Gresen

MULTI-CONTROL VALVE

Capacity 24 GPM
Max. Pressure 1250 PSI
Parallel Application

Model V P

Another Gresen Engineering Triumph In Quality Hydraulics

For Mobile and General Industrial Applications.

FEATURES • • •

- Fully Balanced—Self Centering—Built-in Adjustable Relief Valve.
- Relief Valve Has Replaceable Hardened Seat
- Tripod Mounting Feet
- Check Valve Effective On All Spools
- Smooth Positive Easy Control
- Hardened and Chrome Plated Spools
- Two Position Control Handle 180°

Center sections are available making additional Controls in this Multi-unit.

Write for full details about this better built, money saving valve.

GRESEN MANUFACTURING COMPANY

428 Colfax Ave. N. Dept. H-24 Minneapolis 11, Minn.

PROMPT SERVICE—LOW COST

Flexible—Dependable High, Medium And Low Pressure HYDRAULIC HOSE ASSEMBLIES

- Flexible Hydraulic Control Lines.
- High Pressure, Wire Braided Hose Assemblies Withstand Flexing, Vibration and High Pressure Surges from 800 to 5,000 P.S.I.
- Hose Thoroughly Resistant to all Hydraulic Fluids.
- Carlyle Hydraulic Hose Assemblies are Fabricated to Exact Pressure, Length and Coupling Requirements.
- Shipment of Hose Assemblies are made Same Day Order is Received.

Photo courtesy of Vesper Co.

• *Send for Hose Assembly Catalog. Available upon Request.*

CARLYLE RUBBER COMPANY INC.

62-64 Park Place, New York 7, N. Y. • DI-gby 9-3810

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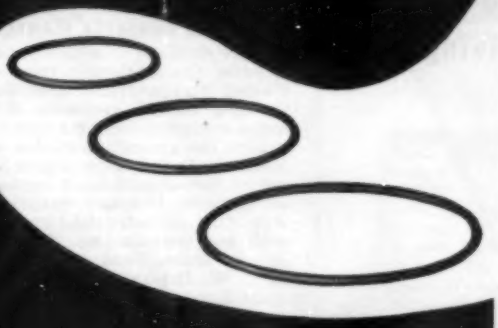
Circle 34 on Reader Service Card

For precision-made seals use LINEAR "O" RINGS



Available from Linear is a wide variety of high quality, precision-moulded "O" rings for industrial applications . . . also "O" rings to meet the latest government requirements, such as AN or MS types to MIL-P-5516, MIL-G-5510, MIL-P-5315 requirements.

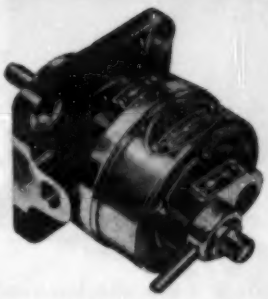
Write or call for complete information.

"PERFECTLY ENGINEERED PACKINGS"

LINEAR

LINEAR Inc., State Rd. & Levick St., Philadelphia 35, Pa.

SAVERY ANNULAR PISTON PUMP



Fixed or Variable Delivery. Pressures up to 3500 p.s.i.

This compact rotary pump without Gears, Valves, Vanes or Springs is of unique design and extreme simplicity in construction.

- Volumetric efficiency as high as 99%
- Positive action at slowest speeds
- Delivery characteristics unaffected by variation in viscosity, feed or back pressure
- No idle pockets to cause air locks or allow coagulation
- No aeration or agitation of the fluid
- No vibration or hammer
- Leakproof

Write for Full Details

DAVIES BROS. 120 WALL STREET NEW YORK 5, N. Y.

Pumps for every engineering need.

SAVE UP TO 85% ON GOVERNMENT SURPLUS

MAGNI-FOCUSER

Has fine ground lenses of optical glass. Neutralizes eye strain from close work. Binocular design gives third dimensional vision. Allows freedom of both hands. Wear over glasses. Plastic frame with adjustable headband.

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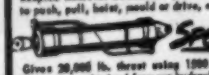

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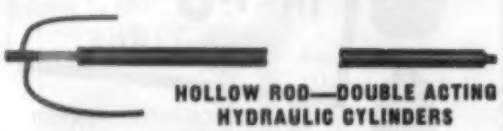

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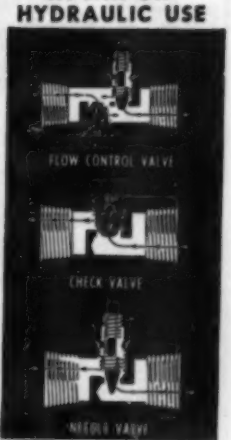

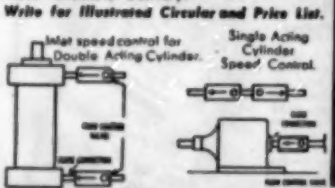

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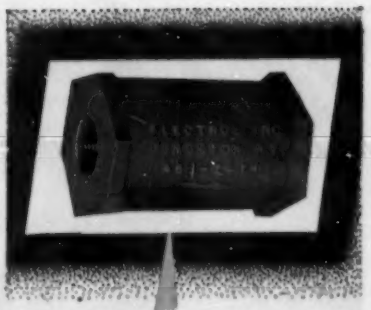

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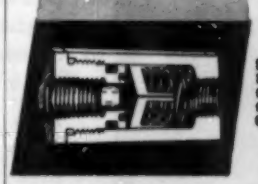

Diagram showing internal construction of the Electrol (463FP) Check Valve.

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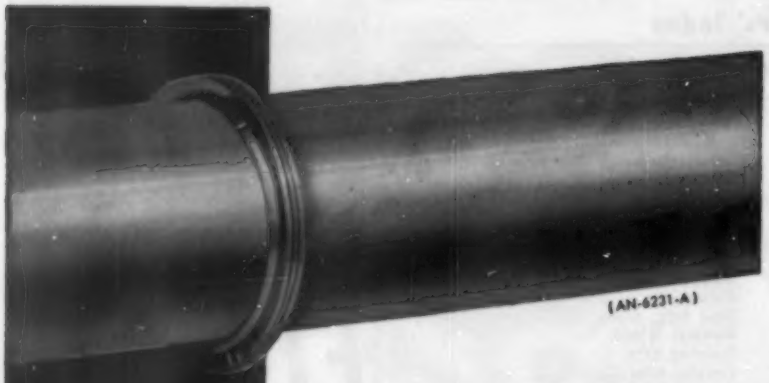

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Dirt means *down-time* for your hydraulic equipment! Dirt means damage to packings, cylinder walls and internal parts. STOP LOST PRODUCTION due to constant replacement of packings. Keep dirt out with HYDRO-WYPE Scraper Rings, and you keep your equipment at peak efficiency longer. HYDRO-WYPES are precision-made for the precision-fit that keeps piston rods clean for more than 2,000,000 cycles—and at low cost, too. They meet or exceed the requirements of MIL-S-5049. Check these HYDRO-WYPE features:

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★ **99% to 99.5% rod contact!**

★ **"Pre-Stressed" for controlled break-out friction!**

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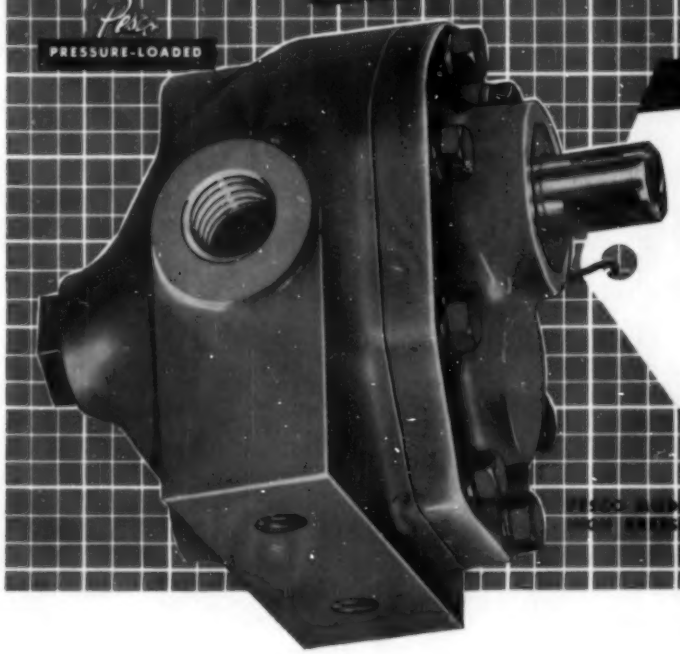
HERE'S A REALLY GREAT HYDRAULIC PUMP... it's PROVED and AVAILABLE!



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HIGH PRESSURE GEAR PUMP

PRESSURES UP TO 2000 PSI

EFFICIENCIES: VOLUMETRIC—UP TO 94%
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OPERATION: CONTINUOUS DUTY WITH OIL AT 150° F.

CAPACITY: 11 GPM AT 2400 RPM

AUTOMATIC ADJUSTMENT FOR OPERATING WEAR

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New developments of the famous Pesco Pressure-Loaded principle incorporated in this model have resulted in new high standards of performance and dependability. From the original development tests through many rugged field applications, this Pesco pump has constantly exceeded anticipated performance.

With volumetric efficiencies up to 94%, mechanical efficiencies up to 88%, and capacity of 11 gpm, it develops pressures up to 2000 psi. In addition, it operates on continuous duty with oil temperature of 150° F.

Pesco Hydraulic Engineers will be glad to show you how this outstanding Model 051002-110 will improve operation of your equipment. Simply call or write the Home Office, Bedford, Ohio.

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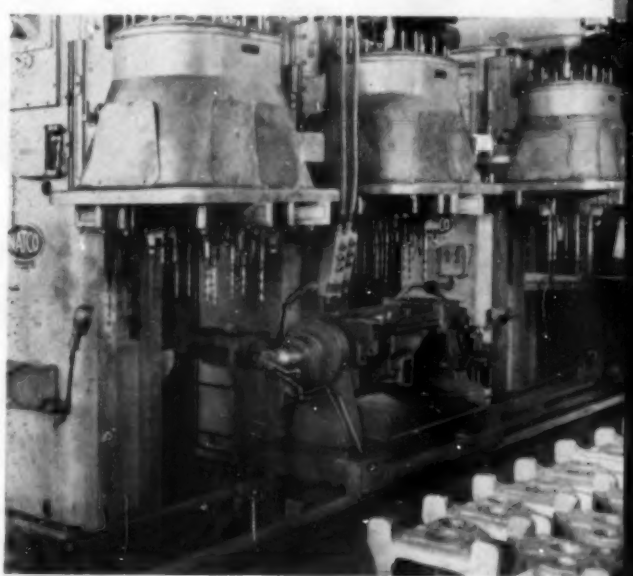
Fluid power is making automation a realizable goal today.

Fluid power alone provides the maximum advantages in the four basic requirements—simplicity, precise control, reliability, and economy. It powers and controls every linear (push, pull, lift, press, clamp) or rotary movement required. Fluid power is truly the keystone in the arch of progress to automation.

APPLIED HYDRAULICS

The magazine of fluid power—presents one of a series of applications showing the leading role of hydraulic and pneumatic circuits in the design of power systems and automatic control for America's production tools.

Air Power Automates Drilling and Tapping of an Automotive Part



Tooling engineers at the Spicer Co., Toledo, Ohio, developed an air powered work shuttling fixture to automatically move large transmission housings between three multiple drilling and tapping machines.

The three machines are tied together by square bar rails on top of which travels an air powered trunnion-type fixture. Design of this traveling fixture required a power system which would:

1. Assure proper automatic sequence of operation
2. Provide the necessary rigidity to the workpiece during drilling
3. Offer complete safety to work, equipment and personnel
4. Be simple to maintain
5. Be practical from a cost standpoint.

Air power was selected because the required clamping and locating functions could best be done by linear cylinder travel. Air is readily available and the circuit can be arranged to provide considerable flexibility in a minimum of space.

All fixture operations are actuated by cam operated pilot valves. The great number of valve operations are easily timed with positive mechanical actuation which greatly simplifies the control problem.

The fixture must stop in the load-unload position and it must be rotated so that the work can be removed and replaced. Then the fixture starts to move to the left over to the first drill position. Before it reaches the first drill, the fixture must rotate 180 degrees into the machining position and a fixture lock and alignment pin must operate. At each drill position a locating plunger must operate.

Between the second and third machine the fixture must rotate to dump chips and rotate back to the work position. At the third machine the work is tapped. The fixture then moves back to the unload position. Before it reaches this position the fixture again rotates 180 degrees.

The entire cost of air components for this "transfer" machine was approximately $1200.

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